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The Behavior of Lead in The Animal Organism-I*

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THE MOST difficult problem in the prevention of industrial lead poisoning arises from the variability in the effect of a given set of conditions upon workmen. The comparatively low toxicity of lead for most men has retarded a general appreciation of the necessity for adequate preventive measures. On the other hand, the remarkable susceptibility to lead of an occasional man has brought about such a state of clinical confusion, that the diagnosis of lead poisoning is often made on the uncertain basis of a history of actual or even presumable exposure to lead compounds. Furthermore, the same individual reacts differently to the same degree of exposure at different times. Thus some individuals apparently develop a degree of immunity to the effects of lead absorption after a period of exposure. The reverse condition—the sudden onset of poisoning in a person of apparently little previous susceptibility—is of more frequent occurrence.

Many attempts have been made to determine the nature of so variable a disease. The collected data illustrate the lack of uniformity in the manifestations of the condition. Animal experimentation has shown that different species of animals, and different individuals of the same species, vary greatly in susceptibility to lead and in the type of induced poisoning which results. There is also great variability in the rate of absorption, and in the rate of excretion in different animals and in the same animal under different conditions.

The foregoing facts indicate that the behavior of lead in the animal organism is subject to a large number of modifying influences. An

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understanding of these requires a knowledge of the detailed behavior of lead in the body under a great variety of conditions.

The most fruitful attempt to bring together experimental and clinical data, to investigate them critically, and to discover an underlying mechanism capable of explaining many confusing and apparently conflicting facts, has been made by Aub and his associates.[1] Their presentation of conclusive evidence of the selective localization of lead in the bones, and the passage of lead out of the bones and out of the body under proper conditions, has resulted in important and advantageous therapeutic measures. However, their interpretation of the mechanisms of selective absorption and mobilization of lead in the body does not explain adequately certain clinical and experimental facts. Furthermore, we still require a knowledge as to the nature of the action whereby lead and the other heavy metals cause injury to the living tissues. It becomes necessary, therefore, to investigate further and in greater detail.

Facts presented herein are based on the following selected items of an extensive experimental program: (1) a study of the distribution of lead in a series of rabbits under uniform conditions, in order to determine the limits of variation for one set of conditions; (2) a comparison of the standard type of distribution thus obtained, with the distribution in animals in which lead has been administered differently and which have been given a very much longer time interval after treatment; (3) a study of the excretion of lead in rabbits under normal conditions, a long time after treatment with lead.

EXPERIMENTAL METHODS

1. Preliminary experiments studying the distribution of lead in animals treated with lead compounds showed a considerable variation. Certain gross variations appeared to be explained by some outstanding factor, such as type of lead compound administered, acute infection, parturition, inadequate diet, or the influence of administered acids and salts.[2] In order to determine a standard type of distribution, a group of 20 full grown rabbits, 10 males and 10 females, were selected because of their similarity in size, age and condition. These were isolated from other animals and from each other in cages in a well lighted, well ventilated room. They were all fed on a standard, mixed diet. Observation was continued 3 weeks to insure against pregnancy in the females and illness in any member of the group. Each animal was given 50 mg. of lead per week in one dose as a solution of lead chloride, for 4 weeks, by means of a stomach tube.

Ten animals developed respiratory infections, varying from slight snuffles to pneumonia, during a period of extreme changes in the weather. The remainder remained well during the entire period. Four of the sick animals died, the other 6 showed some evidence of low grade infection up to the conclusion of the experiment, and at necropsy. These were all localized head infections, without evidence of systemic intoxication.

After the fourth dose an interval of 2 weeks was allowed in order that the alimentary tract might free itself of unabsorbed administered lead. Then, under light anesthesia the blood was drawn off from the heart, slowly and steadily by means of a syringe, until death resulted. This permitted the obtaining of a large quantity of blood for analysis and in addition freed the tissues largely of their blood. The skin was removed with great care not to contaminate the underlying tissues, and discarded. The other tissues were separated cleanly as follows: bone, liver, kidneys, central nervous system (brain and spinal cord), spleen, muscle, adipose tissue, and intestinal tract (washed free of its contents). In the case of several animals the hair on the sides and back which was least likely to be contaminated at any time with feces or urine, was clipped off for separate analysis.

2. In order to determine whether the method of administration and time alter relative distribution of lead in the tissues a number of rabbits which had been given lead, but which had received none for months, were killed and their tissues were examined similarly. All of these had been given lead intravenously. No other recognizable factor was present, except time, however, for great care was used to include only such animals as were perfectly healthy, and which had received no treatment of any kind beyond the administration of water soluble salts of lead.

3. A large series of rabbits has been studied with reference to the excretion of lead under a variety of natural and experimentally induced conditions. The rate of excretion is found to vary strikingly with some of these conditions. The same factors which apparently modify the distribution of lead in the tissues, also alter the rate of excretion.[8] There is, in addition, a striking variation from day to day, dependent upon the amount of food eaten, the amount of water consumed, and the actual amount of excreta. Therefore, it is most important in a study of excretion under normal conditions, not to use animals which are ill in any way, or which have been exposed to any of the recognizable influences which change the distribution of lead in their tissues. It is equally necessary to collect the excreta over a period of time sufficient to equalize the daily variation. Four immediately successive periods of 4 full days each were chosen for this purpose. The average daily excretion was calculated on this basis. Great caution had to be used also in preventing contamination of the excreta with lead from sources other than that intended. Thirteen rabbits carefully selected in this way have supplied the data for this item of the study. They were killed for analysis at the conclusion of the last period over which their excretions were collected. No pathological abnormality was found in any of these at necropsy.

DATA AND DISCUSSION

Table I shows all the analytical data obtained from the group of rabbits treated in the standard manner. A careful examination of the analytical method in use at the time of these analyses has shown an inconstant but possible experimental error of +0.03 mg. of lead. This error has recently been eliminated by a slight modification of technic, but such quantities may not be considered as certainly significant in these data. Therefore, no calculations or conclusions are based on them. All other quantities are used as the basis for the calculation of the concentration of lead in the particular organ. In order to com-

TABLE I

DISTRIBUTION OF LEAD IN RABBITS (Oral Administration)

Tissue	6¼ lbs. Doe Rabbit 212			7 lbs. Doe Rabbit 213			5 lbs. Buck Rabbit 214		
	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index
1. Kidneys	0.03			Nil	Nil	Nil	0.03		
2. Liver	0.10	0.143	0.68	0.08	0.084	1.09	0.08	0.116	0.59
3. Spleen	Nil	Nil	Nil	0.23	15.333	199.20	0.01		
4. Central Nervous System	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
5. Blood	0.06	0.137	0.65	0.02			0.04	0.076	0.38
6. Adipose Tissue	0.12	0.110	0.52	0.07	0.058	0.75	Nil	Nil	Nil
7. Muscle and Connective Tissue	0.17	0.019	0.09	0.34	0.030	0.39	0.15	0.018	0.09
8. Bone	2.85	1.006	4.75	0.70	0.275	3.58	2.50	0.980	4.95
9. Intestinal Tract (Washed free of contents)	0.06	0.035	0.17	0.03			0.02		
10. Hair	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
Total	3.39	0.212	1.00	1.47	0.077	1.00	2.83	0.198	1.00

Tissue	5 14/16 lbs. Buck Rabbit 215			5 10/16 lbs. Buck Rabbit 216			5 14/16 lbs. Buck Rabbit 217		
	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index
1. Kidneys	0.01			Nil	Nil	Nil	0.02		
2. Liver	0.06	0.091	0.58	0.06	0.071	0.95	0.24	0.231	1.02
3. Spleen	Nil	Nil	Nil	0.04	2.000	26.67	0.04	2.667	11.70
4. Central Nervous System	0.01			0.08	0.615	8.15	0.22	1.571	6.89
5. Blood	0.22	0.259	1.66	0.01			0.02		
6. Adipose Tissue	0.07	0.212	1.36	0.02			0.03		
7. Muscle and Connective Tissue	Nil	Nil	Nil	0.26	0.024	0.32	0.16	0.015	0.07
8. Bone	2.25	1.325	8.50	0.79	0.348	4.64	3.12	1.374	6.03
9. Intestinal Tract (Washed free of contents)	0.03			0.02			0.12	0.085	0.37
10. Hair	Thrown away			Thrown away			Thrown away		
Total	2.65	0.156	1.00	1.29	0.075	1.00	3.97	0.228	1.00

Tissue	6 1/16 lbs. Buck Rabbit 221			6 7/16 lbs. Buck Rabbit 223			6 7/16 lbs. Buck Rabbit 224		
	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index
1. Kidneys	0.02			0.02			0.01		
2. Liver	0.05	0.068	0.89	0.06	0.073	0.64	0.20	0.250	1.35
3. Spleen	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
4. Central Nervous System	0.05	0.333	4.38	0.01			0.03		
5. Blood	Nil	Nil	Nil	0.02			0.03		
6. Adipose Tissue	0.05	0.122	1.61	0.03			0.06	0.120	0.65
7. Muscle and Connective Tissue	0.19	0.019	0.25	0.14	0.013	0.12	0.14	0.014	0.05
8. Bone	0.93	0.327	4.26	1.65	0.829	4.17	2.40	1.057	5.71
9. Intestinal Tract (Washed free of contents)	0.01			0.04	0.020	0.18	0.10	0.070	0.38
10. Hair	Thrown away			Thrown away			Thrown away		
Total	1.30	0.076	1.00	1.97	0.114	1.00	2.97	0.185	1.00

Tissue	5 2/16 lbs. Buck Rabbit 225			7 5/16 lbs. Doe Rabbit 226			5 7/16 lbs. Doe Rabbit 227		
	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index
1. Kidneys	0.01			0.01			Nil	Nil	Nil
2. Liver	0.10	0.108	1.23	0.11	0.090	0.95	0.08	0.082	0.90
3. Spleen	Nil	Nil	Nil	0.01			Nil	Nil	Nil
4. Central Nervous System	Nil	Nil	Nil	0.01			Nil	Nil	Nil
5. Blood	Nil	Nil	Nil	0.02			Nil	Nil	Nil
6. Adipose Tissue	0.10	0.147	1.67	0.07	0.031	0.33	0.05	0.185	2.03
7. Muscle and Connective Tissue	0.22	0.024	0.27	0.22	0.016	0.17	0.07	0.005	0.06
8. Bone	0.87	0.437	4.97	1.74	0.767	8.07	1.58	0.557	6.12
9. Intestinal Tract (Washed free of contents)	0.03			0.02			0.07	0.035	0.38
10. Hair	Thrown away			Thrown away			Thrown away		
Total	1.33	0.088	1.00	2.21	0.095	1.00	1.85	0.091	1.00

TABLE I (Cont.)

DISTRIBUTION OF LEAD IN RABBITS (Oral Administration)

Tissue	5 9/16 lbs. Doe Rabbit 228			6 13/16 lbs. Doe Rabbit 229			5 13/16 lbs. Doe Rabbit 230		
	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index
1. Kidneys	0.03			Nil	Nil	Nil	Nil	Nil	Nil
2. Liver	0.05	0.060	3.33	0.04	0.062	0.47	0.18	0.188	0.72
3. Spleen	Nil	Nil	Nil	0.01			0.17	8.500	32.44
4. Central Nervous System	Nil	Nil	Nil	0.02			Nil	Nil	Nil
5. Blood	0.05	0.049	2.72	Nil	Nil	Nil	0.10	0.175	0.67
6. Adipose Tissue	0.07	0.029	1.61	0.08	0.054	0.41	0.15	0.125	0.48
7. Muscle and Connective Tissue	0.10	0.009	0.50	0.14	0.016	0.12	0.28	0.031	0.12
8. Bone	0.05	0.025	1.39	1.77	0.780	5.95	3.00	1.322	5.05
9. Intestinal Tract (Washed free of contents)	Nil	Nil	Nil	0.03			0.53	0.208	0.79
10. Hair	Thrown away			Thrown away			Thrown away		
Total	0.35	0.018	1.00	2.09	0.131	1.00	4.41	0.262	1.00

Tissue	6 lbs. Doe Rabbit 231			Average 8 Bucks 8 Does		
	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index
1. Kidneys	Nil	Nil	Nil	0.02		
2. Liver	0.09	0.101	1.53	0.10	0.117	0.94
3. Spleen	Nil	Nil	Nil	0.02		
4. Central Nervous System	0.05	0.385	5.83	0.03		
5. Blood	0.03			0.04	0.053	0.43
6. Adipose Tissue	0.18	0.073	1.11	0.07	0.067	0.54
7. Muscle and Connective Tissue	0.28	0.023	0.35	0.16	0.015	0.12
8. Bone	0.77	0.302	4.58	1.69	0.722	5.82
9. Intestinal Tract (Washed free of contents)	0.02			0.07	0.039	0.32
10. Hair	Thrown away					
Total	1.42	0.066	1.00	2.20	0.124	

5 5/16 lbs. Doe Rabbit 218

6 9/16 lbs. Doe Rabbit 219

6 2/16 lbs. Buck Rabbit 220

7 7/16 lbs. Buck Rabbit 222

These animals died before completion of experiment. Death apparently due to pneumonia.

TABLE II

STANDARD TYPE OF DISTRIBUTION OF LEAD IN RABBITS (Oral Administration)

Animal Number	Kidneys	Liver	Spleen	Blood	Bone	C.N.S.	Fat	Muscle	G.I.T.
Normal									
213	Nil	1.09	199.2	Nil?	3.58	Nil	0.75	0.39	Nil?
215	Nil?	0.58	Nil	1.66	8.50	Nil?	1.36	Nil	Nil?
216	Nil	0.95	26.67	Nil?	4.64	8.15	Nil?	0.32	Nil?
221	Nil?	0.89	Nil	Nil	4.26	4.38	1.61	0.25	Nil?
226	Nil?	0.95	Nil?	Nil?	8.07	Nil?	0.33	0.17	Nil?
225	Nil?	1.23	Nil	Nil	4.97	Nil	1.67	0.27	Nil?
228	Nil?	3.33	Nil	2.72	1.39	Nil	1.61	0.50	Nil
229	Nil	0.47	Nil?	Nil	5.95	Nil?	0.41	0.12	Nil?
230	Nil	0.72	32.44	0.67	5.05	Nil	0.48	0.12	0.79
231	Nil	1.53	Nil	Nil?	4.58	5.83	1.11	0.35	Nil?
Infected									
212	Nil?	0.68	Nil	0.65	4.75	Nil	0.52	0.09	0.17
214	Nil?	0.59	Nil?	0.38	4.95	Nil	Nil	0.09	Nil?
217	Nil?	1.02	11.70	Nil?	6.03	6.89	Nil?	0.07	0.37
223	Nil?	0.64	Nil	Nil?	4.17	Nil?	0.43	0.12	0.18
224	Nil?	1.35	Nil	Nil?	5.71	Nil?	0.65	0.08	0.38
227	Nil	0.90	Nil	Nil	6.12	Nil	2.03	0.06	0.38
Calculated Mean		1.047			5.563		0.844	0.194	
Standard Deviation ±		0.677			1.197		0.630	0.141	

pare the distribution of lead where the total lead content of the animal varies, calculation has been made of what may be called an "index of selective absorption." This is recorded as the ratio existing between the concentration of lead in the entire carcass, exclusive of the skin, in milligrams per cent, and the concentration of lead in a tissue in milligrams per cent.

Table II illustrates the distribution in these animals with reference to the indices of selective absorption only. The results which are in doubt because of their smallness, as considered against the possible experimental error, are marked "nil?" The infected animals are separated from the others in the table because of the possible influence of their illness on distribution. However, there is no appreciable effect of this factor on the results so that they are included in the calculation of the mean values of the absorption "index." It is not possible to calculate these values for all the tissues concerned both because of the doubtful character of the low results and also because of their variability. In the case of the liver, bone, fat and muscle, however, these values may be calculated with assurance as to the accuracy of the analytical results. The calculated mean and the standard deviation from it are indicated in the table.

A number of significant things are seen in the tabulated data. First of all the quantities of lead found in the entire animals (from 1 to 3 mg.) represent only a very small fraction of the lead administered. There is reason to believe that the method of disposing of the organic material of the tissues (ashing in an electric furnace at a temperature carefully controlled so as not to exceed 500° C.) brings about a slight loss of the lead by volatilization.[4] (This fact probably indicates the formation of compounds of the lead with organic constituents of the tissues.) This loss is never more than a small fraction of the lead present, however, so that it may not be considered as of significance to the present matter. The low lead content of these animals is due to incomplete absorption of the administered lead, or to rapid elimination of that absorbed, or to a combination of both. Examination of data bearing on these two points indicates the probability that not more than 10 per cent of the administered lead was absorbed into the tissues, and that continuous excretion has accounted for the loss of from 50 to 80 per cent of that absorbed.[5]

Although the blood uniformly contains little or no lead, the liver, the adipose tissue, and the muscles, in addition to the bones, contain significant quantities. There is, therefore, an unquestionable selective affinity for lead on the part of all of these tissues. This may or may not be due to some common factor in their physical or chemical char-

acter. In either case their lead binding power differs quantitatively. Other tissues in the body may have similar affinities for lead. Thus an organ may be so small that its lead content is not capable of accurate determination; or its location along the circulatory system, with reference to the portal of entry may be such as to diminish its opportunity

TABLE III

DISTRIBUTION OF LEAD IN RABBITS—TIME FACTOR (Intravenous Administration)

Rabbit Number	171			172			176		
	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index
	?								
Kidneys	0.03			0.04	0.286	2.55	0.08	0.80	17.78
Liver	0.19	0.211	1.76	0.08	0.093	0.83	Nil		
				?					
Spleen	Nil			0.02			Nil		
							?		
C. N. S.	Nil			0.11	0.785	7.01	0.01		
	?			?					
Blood	0.02			0.03			Nil		
	?								
Fat	0.02			0.06	0.056	0.50	0.05	0.012	0.27
Muscle	0.35	0.046	0.38	0.06	0.008	0.07	0.05	0.005	0.11
Bone	1.11	0.489	4.07	1.05	0.463	4.13	0.71	0.313	6.96
G. I. T.	0.04	0.024	0.20	0.12	0.085	0.76	Nil		
Total	1.76	0.120	1	1.57	0.112	1	0.90	.045	1
Dosage	20 Mgs. Intravenously			20 Mgs. Intravenously			35 Mgs. Intravenously		
Time	5 months			5 months			9 months		

Rabbit Number	186			203			205		
	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index
Kidneys	Nil			0.05	0.384	3.62	0.20	1.818	30.30
							?		
Liver	0.08	0.104	0.50	0.13	0.106	1.00	0.03		
				?					
Spleen	Nil			0.03			0.04	4.00	66.67
							?		
C. N. S.	Nil			0.12	1.00	9.43	0.03		
	?								
Blood	0.03			0.04	0.044	0.42	0.06	0.090	1.50
	?						?		
Fat	0.03			0.18	0.033	0.31	0.01		
Muscle	0.24	0.022	0.11	0.21	0.017	0.16	0.05	0.006	0.10
Bone	3.40	1.498	7.27	1.71	0.753	7.10	0.37	0.185	3.10
	?						?		
G. I. T.	0.01			0.06	0.035	0.33	0.03		
Total	3.79	0.206	1.	2.53	0.106	1	0.82	0.060	1
Dosage	40 Mgs. Intravenously			60 Mgs. Intravenously			60 Mgs. Intravenously		
Time	9 months			6 months			6 months		

Rabbit Number	206			175			180		
	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index	Mgs.	Mgs.%	Index
							?		
Kidneys	0.35	2.92	6.47	Nil			0.02		
Liver	0.37	0.493	1.09	Nil			0.40	0.635	4.56
Spleen	0.09	3.00	6.65	Nil			Nil		
C. N. S.	0.09	0.692	1.53	Nil			Nil		
	?								
Blood	0.03			Nil			Nil		
				?					
Fat	0.33	0.943	2.09	0.03			0.09	0.041	0.29
Muscle	0.12	0.017	0.04	0.11	0.01	0.12	0.09	0.011	0.08
Bone	4.24	2.50	5.54	1.48	0.652	7.50	1.59	0.701	5.04
				?					
G. I. T.	0.04	0.020	0.04	0.03			Nil		
Total	5.66	0.451	1	1.65	0.087	1	2.19	0.139	1
Dosage	60 Mgs. Intravenously			20 Mgs. Intravenously			80 Mgs. Intravenously		
Time	3 months			10 months			10 months		

TABLE IV

DISTRIBUTION OF LEAD IN RABBITS—TIME EFFECT (Intravenous Administration)

Animal Number	Kidneys	Liver	Spleen	Blood	Bone	C.N.S.	Fat	Muscle	G.I.T.
171	Nil?	1.76	Nil	Nil	4.07	Nil?	Nil?	0.38	0.20
172	2.55	0.83	Nil?	Nil?	4.13	7.01	0.50	0.07	0.76
176	17.78	Nil	Nil	Nil	6.96	Nil?	0.27	0.11	Nil
186	Nil	0.50	Nil	Nil?	7.27	Nil?	Nil?	0.11	Nil?
203	3.62	1.00	Nil?	0.42	7.10	9.43	0.31	0.16	0.33
205	30.30	Nil?	66.67	1.50	3.10	Nil?	Nil?	0.10	Nil?
206	6.47	1.09	6.65	Nil?	5.54	1.53	2.09	0.04	0.04
175	Nil	Nil	Nil	Nil	7.50	Nil	Nil?	0.12	Nil?
180	Nil?	4.56	Nil	Nil	5.04	Nil	0.29	0.08	Nil
Calculated Mean		1.181			5.833		.506	.142	
Standard Deviation ±		1.335			1.415		.636	.088	

for contact with the blood at a time when it contains high concentrations of lead. This latter factor may be tested by comparing the distribution of lead in the tissues of animals which have received lead in different ways.

Thus Tables III and IV show the effect of intravenous administration of lead upon its distribution in a series of animals. A very long time has elapsed since the administration, during which a very large proportion of the lead has been lost from the body. Yet two things are discernible. There is an increased frequency in the occurrence of significant quantities of lead in tissues other than the bones, liver, adipose tissue and muscle, without corresponding concentrations of lead in the circulating blood. The concentrations in certain tissues may be of a magnitude comparable with that of the bone. This is especially true of the kidneys and the central nervous system. There is a strong probability, therefore, that these tissues have a considerable affinity or combining power for lead, if they have an opportunity to come in contact with adequate concentrations brought by the circulating blood. There is little doubt that the chances of such an occurrence are very much greater if lead is administered intravenously, rather than by way of the alimentary tract. In the latter case, there is ample reason to believe that the liver is normally capable of preventing the appearance of high concentrations of lead in the blood.

The question naturally arises as to whether the lead is bound in all these tissues in the same manner, or whether it may not be firmly bound or stored in inert form in some, while being in less stable combinations in others. It is quite suggestive, in this connection, that despite the loss of 90 per cent or more of their total lead, the relative distribution of lead in the bones, liver, adipose tissue and muscle remains essentially unchanged. Undoubtedly the greatest quantity of the lead lost from the body was removed from the bones. There are three ways in which the relative distribution can remain thus constant. The lead may have been lost rapidly from certain organs with

little relative affinity for it, and subsequently replaced by lead which was released from others in some intermittent normal or accidental manner; or all the tissues may have given up their lead at a rate varying only with the differences in their lead concentrations; or the process of elimination may have been intermittent for all of the tissues, as a result of some naturally or accidentally occurring condition,

TABLE V

RELATION OF EXCRETION TO QUANTITY IN BODY

Rabbit Number	Lead Administered			Intervening time in months	Average Daily Excretion Mgs.	Lead in Carcass Mgs.	Excretion Mgs. Daily/ Mgs. in Body
	Manner	Doses	Amount Mgs.				
115	1	1	10	6	0.050	1.22	0.041
104	0	33	330	0.5	0.055	1.29	0.043
172	1	1	20	5	0.121	1.57	0.077
174	1	1	25	10	0.045	1.65	0.027
175	1	1	20	10	0.031	1.65	0.019
136	1	1	20	12	0.034	1.72	0.020
171	1	1	20	5	0.011	1.76	0.006
150	1	2	80	10	0.066	2.19	0.030
194	1	1	40	9	0.016	2.35	0.007
198	0	4	600	6	0.022	3.75	0.005
206	1	4	60	3	0.120	5.66	0.021
199	0	4	600	6	0.165	6.07	0.027
200	0	4	600	6	0.160	13.61	0.012

capable of simultaneous modification of all the mechanisms whereby lead is held in the tissues.

In any case, it is plain that in the case of rabbits, under apparently normal conditions, lead is capable of steady excretion from all the tissues on which these data supply information. (Other data demonstrate a remarkable ability of central nervous system to retain lead, almost quantitatively.*)

The same point is illustrated by the data in Table V. Here excretion of lead, under normal conditions shows a strikingly frequent dependence upon the total lead content of the animal. Considering individual variation, and the probabilities for the existence of unrecognized factors in the underlying processes of lead mobilization and excretion, there is a notable degree of uniformity. Therefore, one may conclude that the rate of lead excretion varies generally with the quantity of lead in the entire body. It is difficult to understand in any other way the uniformly small proportion of the administered lead remaining in these animals. The loss of from 10 to almost 80 mg. of lead in 6 or 8 months cannot be explained on the basis of the rate of excretion found at the time of these observations. Lead must have been poured out at a much more rapid rate in the periods following shortly after administration. If the truth of this reasoning be accepted, then the lead in all of the tissues is influenced by the same set of reactions in the body, or by varying reactions in different tissues operating simultaneously or in close succession.

These considerations lead to the belief that lead is not converted quantitatively in the body to the relatively insoluble inorganic secondary and tertiary phosphates.[7-8] Speculation as to a mechanism capable of explaining the experimental facts suggest that a significant portion of the lead in the body exists in the form of compounds or complexes with organic constituents of the tissues. To the extent to which inorganic tertiary and secondary phosphates are present, an equilibrium may exist between them and such organic compounds—an equilibrium constantly shifting by reason of the conversion of the organic compounds into the forms in which lead is excreted.

PRACTICAL APPLICATIONS

The application of the observed facts to clinical and industrial practice may be briefly suggested. Data obtained on a large number of cases of lead absorption in man, give evidence that both fecal and urinary lead excretion in man vary in quantity with the extent and severity of exposure to lead compounds.[9] This provides indirect evidence that the quantitative factor in such excretion is based upon the quantity of lead in the body of the subject. It also indicates a probability that the conditions which influence the absorption and excretion of lead in the normal man are similar to those in the rabbit. Direct evidence in this matter will be difficult if not impossible to obtain. If such tentative conclusions are correct, however, it should be possible to determine the approximate lead content of a given subject by a careful study of his lead excretion over a sufficient period of time, during which no known factor is allowed to modify the normal rate. It may also be possible to determine the relationship of a given rate of excretion of lead to the appearance of symptoms.

Furthermore, if lead excretion varies with exposure, it becomes possible by studying a sufficient number of men in this way to measure adequately the lead hazards associated with various occupations. Such a method provides a check on the adequacy of all the preventive measures used to control a given hazard, including the extremely variable and undependable element of carefulness on the part of the workers. The usefulness of such information, capable of interpretation on a sound basis, is obvious, both in the domain of industrial preventive medicine, and in the larger field of the public health.

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Accuracy of Certified Causes of Death*

SINCE our report of a year ago before this section, your Committee on Accuracy of Certified Causes of Death has had several meetings and two members of the committee have, at the request of the League of Nations, represented American opinion in this field at a conference of statistical experts in Geneva, and have presented formally to the special committee of the International Institute of Statistics, their point of view prior to the conference held in Paris, in April, 1927.

The Health Section of the League of Nations assembled a small group of medical registrars, statistical officers and physicians, to consider preliminary revision of the International List. The result of this conference was the preparation of an intermediate list of 90 titles, as well as the revision of the abridged list to include only 27 titles. These lists were published in the September issue of the *American Journal of Public Health*.

At the meeting of the Committee of the International Institute of Statistics in Paris, consideration of the revision of the International Lists was continued in much the same spirit, and by several of the same persons who attended the Geneva conference, with the result that three revised lists have been prepared for presentation at the meeting of the International Institute at Cairo in December of this year. These lists also have been published in the September *American Journal of Public Health*.

Your committee is of the opinion that the issuance of three international lists is desirable; a detailed list of approximately 200 titles; an intermediate list of approximately 90 titles; and an abridged list of something over 30 titles.

Since the two meetings in Europe above referred to, your committee has again considered all the facts at hand, and in its present report offers you three lists which are designed to preserve comparability, and recommends your approval of them as the expression of American opinion, to be forwarded to both the Health Section of the League of Nations and the International Institute of Statistics, in response to their formal requests.

Other countries have in preparation similar revisions, and it is expected that further conferences under international and scientific

* Report of the Committee on the Accuracy of Certified Causes of Death and Its relation to Mortality Statistics and the International Classification. (Adopted by the Vital Statistics Section of the American Public Health Association at the Fifty-sixth Annual Meeting at Cincinnati, O., October 19, 1927.)

auspices will be held between now and 1929, when the French Government will convoke the International Conference in Paris which will decide the final revision of the International Lists as of the year 1930.

All these preliminary conferences are, in the opinion of your committee, desirable and necessary for the purpose of reaching the greatest possible agreement as to principles and practices before the final conference of 1929. It is the opinion of your committee that very considerable improvement has been attained in the terms used, in the groups under which the terms are assembled, and in the addition of an intermediate list to the detailed and abridged lists of causes of death already in use.

In the preparation of the three revised lists as offered for your consideration, the factors of greatest importance (after scientific accuracy in terminology) in determining acceptance or rejection of suggestions for changes, coming from other countries, or originating from American statisticians, have been the preservation of comparability with past records, and the facilitating of a wider use of the International List than has been obtained up to the present time.

The committee voted to include as a part of its own report that of the committee on Joint Causes of Death. This appeared in the February, 1928, issue of the *American Journal of Public Health and The Nation's Health,* and need not be repeated here.

The following are the lists recommended by your committee. The numbers in parentheses in the Intermediate and Abridged lists refer to the titles of the Detailed list which are included.

REVISED LISTS

A. DETAILED LIST

1. Typhoid and paratyphoid fever
   (a) Typhoid fever
   (b) Paratyphoid fever
2. Typhus fever
3. Malta fever
4. Small-pox
5. Measles
6. Scarlet fever
7. Whooping cough
8. Diphtheria
9. Influenza
   (a) with pulmonary complications specified
   (b) without pulmonary complications specified
10. Mumps
11. Asiatic cholera
12. Cholera nostras
13. Dysentery
    (a) Amebic
    (b) Bacillary
    (c) Unspecified or due to other causes
14. Plague
    (a) bubonic
    (b) pneumonic
    (c) septicemic
    (d) unspecified
15. Erysipelas
16. Acute anterior poliomyelitis
17. Lethargic encephalitis
18. Meningococcus meningitis
19. Glanders
20. Anthrax
21. Rabies
22. Tetanus
23. Tuberculosis of the respiratory system

24. Tuberculosis of the meninges and central nervous system
25. Tuberculosis of the intestines and peritoneum
26. Tuberculosis of the vertebral column
27. Tuberculosis of the bones and joints (vertebral column excepted)
    (a) bones
    (b) joints
28. Tuberculosis of other organs
    (a) Tuberculosis of the skin and subcutaneous tissue
    (b) Tuberculosis of the lymphatic system (mesenteric and retroperitoneal glands excepted)
    (c) Tuberculosis of the genitourinary system
    (d) Tuberculosis of organs other than above
29. Disseminated tuberculosis
    (a) Acute
    (b) Chronic or unspecified
30. Leprosy
31. Syphilis
    (a) Congenital
    (b) Acquired
    (c) Unspecified
32. Gonococcus infection
33. Purulent infection, septicemia (including pyemia and bacteriemia)
34. Malaria
    (a) Malarial fever
    (b) Malarial cachexia
35. Relapsing fever (spirillum obermeieri)
36. Yellow fever
37. Spirochetal hemorrhagic jaundice
38. Other spirochetoses
39. Ancylostomiasis
40. Hydatid cyst
    (a) of the liver
    (b) of other organs or tissue
41. Other diseases due to animal parasites
42. Mycoses
43. Other epidemic, endemic, infectious, and parasitic diseases*
    *Diseases of unusual prevalence should be separately tabulated.
44. Cancer and other malignant tumors of the buccal cavity
45. Cancer and other malignant tumors of the pharynx, esophagus, stomach, liver
46. Cancer and other malignant tumors of the peritoneum, intestines, rectum
47. Cancer and other malignant tumors of the female genital organs
48. Cancer and other malignant tumors of the breast
49. Cancer and other malignant tumors of the skin
50. Cancer and other malignant tumors of other or unspecified organs
51. Benign tumors and tumors not returned as malignant (without exception)*
    *Subdivide by at least ten subtitles by anatomical site.
52. Acute rheumatic fever
53. Chronic rheumatism, osteoarthritis, gout
    (a) Gout
    (b) Others under this title
54. Scurvy
55. Pellagra
56. Beriberi
57. Rickets and other softenings of the bones
    (a) Rickets
    (b) Other softenings of the bones
58. Diabetes mellitus
59. Anemia, pernicious and other
    (a) Pernicious anemia
    (b) Other anemias and chlorosis
60. Leukemia and Hodgkin's disease
    (a) Leukemia
    (b) Hodgkin's disease
61. Diseases of the pituitary gland
62. Diseases of the thyroid gland
    (a) Exophthalmic goiter
    (b) Other diseases of the thyroid gland
63. Diseases of the parathyroid glands
64. Diseases of the thymus gland
65. Diseases of the adrenal glands or capsules (Addison's disease)
66. Diseases of the spleen
67. Alcoholism (acute or chronic)*
    *Acute poisoning by methyl or denatured alcohol excluded; see 180
68. Chronic lead poisoning
69. Other chronic occupational poisonings
70. Other chronic poisonings
71. Other general diseases
72. Encephalitis
73. Meningitis
74. Tabes dorsalis (locomotor ataxia)
75. Other diseases of the spinal cord
76. Cerebral hemorrhage, apoplexy
    (a) Cerebral hemorrhage
    (b) Cerebral embolism and thrombosis
77. Paralysis without specified cause
    (a) Hemiplegia
    (b) Others under this title
78. General paralysis of the insane
79. Other forms of mental alienation
80. Epilepsy
81. Convulsions (nonpuerperal; 5 years and over)
82. Infantile convulsions (under 5 years of age)
83. Chorea
84. Neuralgia and neuritis
85. Other diseases of the nervous system
    (a) Softening of the brain

(b) Other diseases of the nervous system
86. Diseases of the eye and annexa
87. Diseases of the ear and of the mastoid process
(a) Diseases of the ear
(b) Diseases of the mastoid
88. Pericarditis
(a) Acute and unspecified
(b) Chronic
89. Endocarditis and myocarditis (acute)
90. Chronic endocarditis and valvular diseases of the heart
91. Angina pectoris
92. Other and unspecified diseases of the heart
(a) Chronic myocarditis
(b) Functional diseases of the heart
(c) Other and unspecified diseases of the heart
93. Aneurysm
94. Arteriosclerosis and other diseases of the arteries
(a) Arteriosclerosis
(b) Other diseases of the arteries
95. Embolism and thrombosis (cerebral and pulmonary excepted)
96. Diseases of the veins (varices, hemorrhoids, phlebitis, etc.)
97. Diseases of the lymphatic system, (lymphangitis, etc.)
98. Hemorrhage without specified cause
99. Other diseases of the circulatory system
100. Diseases of the nasal fossae and their annexa
101. Diseases of the larynx
102. Bronchitis
(a) acute
(b) chronic
(c) unspecified (under 5 years of age)
(d) unspecified (5 years and over)
103. Bronchopneumonia (includes capillary bronchitis)
104. Pneumonia, lobar and unspecified
(a) lobar
(b) unspecified
105. Pleurisy
106. Congestion, embolism, and hemorrhagic infarct of the lung
107. Gangrene of the lung
108. Asthma
109. Pulmonary emphysema
110. Other diseases of the respiratory system (tuberculosis excepted)
(a) Chronic interstitial pneumonia, including occupational diseases of the respiratory system
(b) Diseases of the mediastinum
(c) Others under this title
111. Diseases of the mouth and annexa
112. Diseases of the pharynx and tonsils (including adenoid vegetations)
113. Diseases of the esophagus
114. Ulcer of the stomach and duodenum
(a) Ulcer of the stomach
(b) Ulcer of the duodenum
115. Other diseases of the stomach (cancer excepted)
116. Diarrhea and enteritis (under 2 years of age)
117. Diarrhea and enteritis (2 years and over)
118. Appendicitis and typhlitis
119. Hernia, intestinal obstruction
(a) Hernia
(b) Intestinal obstruction
120. Other diseases of the intestines
121. Cirrhosis of the liver
(a) Specified as alcoholic
(b) Not specified as alcoholic
122. Biliary calculi
123. Other diseases of the liver and biliary passages (includes acute yellow atrophy)
124. Diseases of the pancreas
125. Peritonitis without specified cause
126. Other diseases of the digestive system (cancer and tuberculosis excepted)
127. Acute nephritis (including unspecified under 10 years of age)
128. Chronic nephritis (including unspecified 10 years and over)
129. Other diseases of the kidneys and annexa
130. Calculi of the urinary passages
131. Diseases of the bladder
132. Diseases of the urethra, urinary abscess, etc.
(a) Stricture of the urethra
(b) Others under this title
133. Diseases of the prostate
134. Nonvenereal diseases of the male genital organs
135. Salpingitis and pelvic abscess (female)
136. Nonpuerperal uterine hemorrhage
137. Other diseases of the female genital organs
138. Nonpuerperal diseases of the breast (cancer excepted)
139. Accidents of pregnancy
(a) Abortion
(b) Ectopic gestation
(c) Others under this title
140. Puerperal hemorrhage
141. Other accidents of labor
(a) Cesarean section
(b) Other surgical and instrumental deliveries
(c) Others under this title
142. Puerperal septicemia
143. Puerperal phlegmasia, embolism, sudden death
144. Puerperal albuminuria, eclampsia, and convulsions

145. Other conditions of the puerperal state
146. Gangrene
    (a) Senile
    (b) Others
147. Furuncle
148. Acute abscess
149. Other diseases of the skin and annexa
150. Diseases of the bones (tuberculosis excepted)
151. Diseases of the joints (tuberculosis and rheumatism excepted)
152. Other diseases of the organs of locomotion
153. Congenital malformations (stillbirths not included)
154. Congenital debility, icterus, and sclerema
155. Premature birth; Injury at birth
    (a) Premature birth
    (b) Injury at birth
156. Other diseases peculiar to early infancy
157. Lack of care
158. Senility
159. Suicide by solid or liquid poisons (corrosive substances excepted)
160. Suicide by corrosive substances
161. Suicide by poisonous gas
162. Suicide by hanging or strangulation
163. Suicide by drowning
164. Suicide by firearms
165. Suicide by cutting or piercing instruments
166. Suicide by jumping from high places
167. Suicide by crushing
168. Other suicides
169. Infanticide (murders under 1 year)
170. Homicide by firearms
171. Homicide by cutting or piercing instruments
172. Other homicides

NOTE: In classifying deaths from accidents, the primary nature of the accident takes preference over the mode of death. For example, a death resulting from a fracture of skull sustained in an automobile accident, would be charged to the latter.

173. Accidents in mines and quarries
174. Accidents from machinery
175. Accidents from transportation
    (a) Railroads
    (b) Street cars
    (c) Automobiles
    (d) Motorcycles
    (e) Aeroplanes and balloons
    (f) Water transportation
    (g) Other vehicles
176. Conflagration
177. Accidental burns (conflagration excepted)
178. Poisoning by food
179. Poisoning by venomous animals
180. Other acute accidental poisonings (gas excepted)
181. Accidental absorption of irrespirable, irritating, or poisonous gas
182. Accidental mechanical suffocation
183. Accidental drowning
184. Accidental traumatism by firearms
185. Accidental traumatism by cutting or piercing instruments
186. Accidental traumatism by fall
187. Injuries by animals (not poisoning)
188. Starvation (deprivation of food or water)
189. Excessive cold
190. Excessive heat
191. Lightning
192. Other accidental electric shocks
193. Other external violence
194. Sudden death
195. Cause of death not specified or ill-defined

B. INTERMEDIATE LIST

1. Typhoid and paratyphoid fever (1)
2. Small-pox (4)
3. Measles (5)
4. Scarlet fever (6)
5. Whooping cough (7)
6. Diphtheria (8)
7. Influenza (9)
8. Dysentery (13)
9. Tuberculosis of the respiratory system (23)
10. Tuberculosis, other forms (24-29)
11. Syphilis (31)
12. Purulent infection, septicemia (including pyemia and bacteriemia (33)
13. Malaria (34)
14. Diseases due to animal parasites (39, 40, 41)
15. Other epidemic, endemic, infectious and parasitic diseases (2, 3, 10, 11, 12, 14-22, 30, 32, 35-38, 42, 43)
16. Cancer and other malignant tumors (44-50)
17. Benign tumors and tumors not specified as malignant (without exception) (51)
18. Acute rheumatic fever (52)
19. Chronic rheumatism, osteoarthritis, gout (53)
20. Avitaminoses (deficiency diseases) (54-57)
21. Diabetes mellitus (58)
22. Pernicious and other anemias (59)
23. Leukemia and Hodgkin's disease (60)
24. Diseases of the thyroid gland (62)
25. Other diseases of nutrition and of the ductless glands (61, 63, 64, 65, 66)
26. Alcoholism (acute or chronic) (67)

NOTE: Does not include acute poisoning by methyl or denatured alcohol. See Title No. 84.

27. Other chronic poisonings (68-70)
28. Other general diseases (71)
29. Meningitis (73)

30. Tabes dorsalis (locomotor ataxia) (74)
31. Cerebral hemorrhage, apoplexy (to include paralysis, hemiplegia, cerebral embolism and thrombosis) (76, 77)
32. General paralysis of the insane (78)
33. Other forms of mental alienation (79)
34. Epilepsy (80)
35. Other diseases of the nervous system (72, 75, 81-85)
36. Diseases of the eye, the ear and their annexa (86, 87)
37. Pericarditis (88)
38. Endocarditis and myocarditis (acute) (89)
39. Chronic endocarditis and valvular diseases of the heart (90)
40. Angina pectoris (91)
41. Other and unspecified diseases of the heart (92)
42. Aneurysm (93)
43. Other diseases of the arteries (94)
44. Embolism and thrombosis (cerebral and pulmonary excepted (95)
45. Other diseases of the circulatory system (96-99)
46. Bronchitis (102)
47. Bronchopneumonia (includes capillary bronchitis) (103)
48. Pneumonia, lobar and unspecified (104)
49. Pleurisy (105)
50. Other diseases of the respiratory system (tuberculosis excepted) (100, 101, 106-110)
51. Ulcer of the stomach and duodenum (114)
52. Diarrhea and enteritis (116, 117)
53. Appendicitis and typhlitis (118)
54. Hernia, intestinal obstruction (119)
55. Cirrhosis of the liver (121)
56. Biliary calculi (122)
57. Other diseases of the liver and biliary passages (includes acute yellow atrophy) (123)
58. Other diseases of the digestive system (111-113, 115, 120, 124-126)
59. Acute nephritis (127)
60. Chronic nephritis (128)
61. Other diseases of the kidneys and annexa (129)
62. Calculi of the urinary passages (130)
63. Diseases of the bladder (131)
64. Diseases of the prostate (133)
65. Other nonvenereal diseases of the genito-urinary system (132, 134-138)
66. Accidents of pregnancy (139)
67. Puerperal hemorrhage (140)
68. Puerperal septicemia (142)
69. Puerperal albuminuria, eclampsia, and convulsions (144)
70. Other puerperal causes (141, 143, 145)
71. Diseases of the skin and cellular tissue (146-149)
72. Diseases of the bones and of the organs of locomotion (tuberculosis and rheumatism excepted) (150-152)
73. Congenital malformations (stillbirths not included) (153)
74. Congenital debility, icterus and sclerema (154)
75. Premature birth; Injury at birth (155)
76. Other diseases peculiar to early infancy (156, 157)
77. Senility (158)
78. Suicide (159-168)
79. Homicide (169-172)
80. Accidents in mines and quarries (173)
81. Accidents from machinery (174)
82. Accidents from transportation (175)
83. Accidental burns (including conflagrations) (176, 177)
84. Acute accidental poisonings (gas excepted) (178-180)
85. Accidental absorption of irrespirable, irritating, or poisonous gas (181)
86. Accidental drowning (183)
87. Accidental traumatism by fall (186)
88. Other external violence (182, 184, 185, 187-193)
89. Cause of death not specified or ill-defined (194, 195)

C. ABRIDGED LIST

1. Typhoid and paratyphoid fever (1)
2. Small-pox (4)
3. Measles (5)
4. Scarlet fever (6)
5. Whooping cough (7)
6. Diphtheria (8)
7. Influenza (9)
8. Tuberculosis of the respiratory system (23)
9. Tuberculosis, other forms (24-29)
10. Cancer and other malignant tumors (44-50)
11. Benign tumors and tumors not returned as malignant (without exception) (51)
12. Diabetes mellitus (58)
13. Cerebral hemorrhage, apoplexy (to include paralysis, hemiplegia, cerebral embolism and thrombosis) (76, 77)
14. Diseases of the heart (88-92)
15. Other diseases of the circulatory system (93-99)
16. Bronchitis (102)
17. Pneumonia (all forms) (103, 104)
18. Other diseases of the respiratory system (100, 101, 105-110)
19. Diarrhea and enteritis (116, 117)
20. Appendicitis and typhlitis (118)
21. Cirrhosis of the liver (121)

22. Other diseases of the digestive system (111-115, 119, 120, 122-126)
23. Acute and chronic nephritis (127, 128)
24. Other diseases of the genitourinary system (129-138)
25. Puerperal septicemia (142)
26. Other puerperal causes (139-141, 143-145)
27. Congenital debility, malformations, premature birth, etc. (153-157)
28. Other defined diseases (2, 3, 10-22, 30-43, 52-57, 59-75, 78-87, 146-152, 158)
29. Suicide (159-168)
30. Violent deaths (suicide excepted) (169-193)
31. Cause of death not specified or ill-defined (194, 195)

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Stop! Look For The Approved Service Station

IN Delaware the State Board of Health and the owners of service stations have combined efforts to safeguard the health of motorists across the state and to afford them sanitary conveniences.

Along the roads signs posting the service stations have been erected indicating that a couple of hundred feet ahead pure water supplies and sanitary toilets are available.

Periodic monthly inspection of all signed service stations is made by the State Board of Health and where sanitary standards demanded by health authorities are not maintained, the signs are taken down. Sixteen stations are equipped with water under pressure and have flush toilets with connection to septic tanks. The majority provide wash basins, soap and paper towels and cups. Two of the approved stations have shower baths. Several provide rest rooms for women.

The signs erected, at an original cost of $6.30 each, by the service stations are 32″ on each face with a green background, white letters and a white border. They are mounted on green posts 9′ x 5″ x 3″. The sign bears a Blue Hen, the insignia of the State of Delaware.

The Venereal Disease Clinic*

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THE essentials in the organization and operation of a venereal disease clinic will vary according to the amount of money available and the purpose of the clinic.

In this paper the essentials of only one type of clinic will be considered, the clinic which is run chiefly in the interest of public health in a city with a population of not less than 25,000 or in a smaller center serving a population of at least 50,000. In cities of half a million or more inhabitants, certain clinics may have an overabundance of funds and may find it necessary to add to the essentials in order to increase the budget, but some of the worst clinics may be found in the largest cities. In any city, the essentials described will serve as a framework, and additions may be made according to the available financial and medical facilities, and the necessity of treating a greater number of persons.

ESSENTIALS OF ORGANIZATION AND OPERATION

Organization—The physician who is organizing a clinic should get the active support of the local and state health departments as well as the hospital or branch of the local government which provides the clinic facilities. The physician alone may have difficulty in educating the local politicians to the necessity for a clinic, but the educational work by the local and state health department will teach the local officials the need for a venereal disease clinic.

If the clinic is to be placed in a small hospital in a small town there may be some difficulty in getting clinic space, although in the larger city the hospital usually has run a clinic long before the department of health became interested. Before the war many of these hospital clinics were of doubtful value to the community, but the need for efficient antivenereal work during the war stimulated these clinics to do more scientific work, and local health departments since then have succeeded in making many of them of greater value to the community by stimu-

* Read at a Special Session on Venereal Disease Control, of the American Public Health Association at the Fifty-sixth Annual Meeting at Cincinnati, O., October 20, 1927.

lating a public health attitude. The local health department should be active in supervising and often in performing the public health work of the clinic. The best results are obtained where an active health officer actually controls the work of the clinic and directs its public health activities.

In many places where there were no clinics the state health departments have provided funds for the first year while the clinics were being organized, but it should be realized that every clinic is primarily a local problem and should be supported by those it serves. Usually there is little difficulty in obtaining the necessary funds in localities really needing clinics. Most hospitals are willing to supply space if the local health department supplies the drugs. In fact, many hospitals bear the entire burden, except for the assistance of a small fee from the patient.

When the clinic is entirely supported by the hospital, usually the physicians receive no remuneration other than the experience they may get and the advertising value of the position. In some hospitals, a fee is charged and the physician is given money for his services. The objection to this plan is that there usually is active competition by the pay clinic with many practicing physicians even though a pay clinic does not injure the practice of those who treat only the wealthy.

In the hospital clinic, a nurse is supplied for the clinic hours, but sometimes there is difficulty in obtaining a clerk, so occasionally the nurse is given this additional work. When a clerk is not provided, usually there is no follow-up work done, unless it is by the local health department. Efficient follow-up work is the essential public health work of the clinic, as it brings under treatment sources of infection and keeps the fresh cases under treatment until they remain permanently non-infectious. A clinic without efficient follow-up service is of doubtful value to the community.

In the public health clinic, run and financed by the local health department, the physician usually is paid a yearly salary. This salary varies from a nominal figure to adequate compensation, as each community has a different idea about the public health value of physicians.

The probable reason for the extreme variations in methods of financing clinics is that venereal disease clinics have only recently become of value to public health. Previously clinics were merely places where physicians acquired experience in examining patients instead of, as now, being places where the patients are relieved and made of little danger to the public health.

Operation—For the operation of the clinic, the essential staff consists of a physician, a nurse, and a clerk who is also the follow-up worker. Usually there will be a much needed assistant physician.

The physician should assign the duties of the staff, form the policies of the clinic, and teach the others to do much of the examination and treatment work and do the rest himself.

The nurse should prepare the clinic, the drugs, and instruments for use at each clinic period. The nurse usually is a woman and may prepare the patients of both sexes. She should be held responsible for all equipment being in the proper condition before it is to be used. If the nurse is incompletely trained, the physician should see that she learns to keep the needles polished with a scouring powder and sharpened with a fine pocket stone and free from any hooks or burrs. Syringes of good quality can be dropped into boiling water and sterilized ready for use with needles attached, so there is no necessity for separate sterilization and mixing of plungers and barrels with greater chance for contamination in the assembling process. She should teach the patients to get into position for examination or treatment quickly. After a little training, an intelligent nurse or other person can take blood specimens, and give intramuscular and intravenous injections, under the supervision of a physician. If the physician does most of this work, the nurse should fill the syringes, and receive the intravenous syringes as they are used, immediately running water through the syringes and needles and returning them to the sterilizer.

The clerk should admit the patients to the clinic, fill in the histories as far as possible, check the delinquent patients and send out the form letters requesting them to return. The clerk may do the follow-up work of delinquent patients if it is not done by the local health department or the nurse.

Follow-up work can be done not only by outside visits and letters, but by the patients themselves. The patient in most cases can be persuaded by means of proper educational work in the clinic to bring in the known source of infection. This educational work by all the members of the staff will put the patients in such a frame of mind as will decrease the number of delinquent patients. There will be a certain amount of overlapping of duties, but the physician can decide on the basis of local conditions the best way to assign the work.

The operation of the clinic will be much simplified if there is a definite routine for each patient on admission.

An intelligent clerk with a little experience can classify correctly with a provisional diagnosis of gonorrhea or syphilis most of the patients as they apply for treatment. This clerk should fill in the history with the name, address, date, age, sex, color, nativity and marital status, the apparent duration of infection, the name and address of the source of infection, the date of exposure as nearly as can be deter-

mined, the date of the first symptoms, and sometimes naming the important symptoms with a very short statement of the subsequent course of the disease. The patient's occupation should be entered, together with the weekly income and the number of dependents, the employer's name and business address, and the name and address of any persons exposed since infection.

If the patient has congenital syphilis, the name and address of the father and mother and sisters and brothers should be listed, and the patient should be urged to bring these persons into the clinic for examination. If the patient has acquired syphilis, the name of the husband or wife and children should be entered and the patient should be told to bring in these exposed persons for examination. In states where it is required by law, the name and address of the source of infection should be reported to the state department of health, and an entry should be made on the history as a check to show that a report was sent to the state department of health. Sometimes these reports cannot be sent out immediately and there should be some way of checking over the histories from time to time.

If the patient has gonorrhea all persons exposed since the time of the infecting contact should be placed under observation by a visit to the clinic. Their names should be entered on the history form immediately, and the findings when they are brought in and examined.

After the clerk has filled in the history as fully as possible, the patient is taken to the physician to have the examination completed, the diagnosis made, any necessary treatment outlined provisionally on the history, and any further recommendations made about contacts and diagnostic procedures. If it is possible before any treatment is given, the social worker or some other person should make the patient thoroughly understand his duty in avoiding any further spreading of his disease and the assistance he should render in helping to control venereal disease as a partial return for the medical service he is to receive. A card for the immediate attention of the follow-up worker should be made out for each source of infection or apparently infectious contact.

The follow-up worker should inspect the treatment sheets at definite intervals to see that the patients are attending the clinic regularly. The physician should mark on the chart by drawing a line for each week the patient is told he need not attend the clinic whenever his injections are temporarily discontinued. Then these patients who are not delinquent will not be told by mistake that they should be in the clinic.

This definite routine in the operation of a venereal clinic will save time and make more efficient the work of the physician in diagnosis and treatment.

ESSENTIALS OF DIAGNOSIS AND TREATMENT

A tentative diagnosis of venereal infection may be made from the immediate findings, but every patient should have blood taken for tests for syphilis, and should have a general physical examination, preferably stripped, which should include an examination for gonnorhea. This general examination of all persons for both gonorrhea and syphilis should be supplemented by special examinations for the particular disease which is very strongly suspected. Infections with two diseases are so common that syphilitic females particularly should be examined for gonorrhea, and all patients, of course, should have a routine blood test for syphilis. In the examination for syphilis and chancroid, the laboratory procedures usually are the more important, but in watching for gonorrhea, except in the acute stage, the clinical findings are the more significant.

GONORRHEA IN THE MALE

The diagnosis of acute gonorrhea in the male is obvious if the patient presents himself with a purulent urethral discharge coming on in from 2 days to 2 weeks after intercourse. Even in a public health clinic it is well to spare the slight time to make a smear in order to avoid the mistake of thinking that more than one discharge in a hundred is caused by anything but the gonococcus.

When the patient's discharge has ceased he is ready for the tests of cure. When the patient goes through a period of 1 month without any discharge or morning drop, he is given an instillation of 2 c.c. of a 1 per cent solution of silver nitrate. He comes back one month later, if he has no discharge in the meantime, and is given another instillation. In 4 weeks, if he has had no discharge, a large sound is passed. At the end of another month he returns for the passage of another sound.

If all the tests of cure are negative, he is told he is probably cured, but that he should have no intercourse without a condom for the next 6 months. He is told that if he has no symptoms in the meantime he can consider himself cured at the end of that time.

While the majority of cases of acute gonorrhea get well fairly readily under ordinary treatment, a tenth will be found to have a persistent morning drop or other sign of chronic gonorrhea.

The diagnosis of chronic gonorrhea in the male is made on the clinical evidence with such findings as an excess of pus cells from the prostate and various kinds of shreds in the urine. There is little chance of proving the presence of gonococci by smears. Most cases with persisting intracellular gonococci in the discharge should be classified as

acute or subacute gonorrhea, even though the disease may have been present for some time, as such patients require more gentle treatment than the usual case of chronic gonorrhea.

The exact treatment whether by dilating or by massage of the urethra and prostate and seminal vesicles or by stimulating injections and applications will depend mainly on clinical findings. Results of treatment will depend upon the energy, intelligence and experience of the clinician and not upon any textbook routine.

GONORRHEA IN THE FEMALE

The diagnosis of gonorrhea in the female in the acute stage can readily be made on either clinical or laboratory evidence. Smears from the urethra at this time will generally show almost as definite a picture as smears in acute gonorrhea in the male. The diagnosis of chronic gonorrhea in the female is difficult and usually must be made from the history and clinical findings. A profuse vaginal discharge and cervical involvement without obvious cause should be tentatively considered gonorrheal until proved otherwise. Induration of Bartholin's glands and inflammation or induration of the urethra are further evidence of gonorrhea, although not pathognomonic.

A carefully taken smear from the urethra may show gonococci. The tip of a wooden applicator is tightly wound with just enough cotton to cover it and inserted gently almost one-half inch into the female urethra, which is well massaged or "stripped" from below. This applicator is rolled or tapped over one end of a microscope slide to make an impression preparation instead of a smear. Material from the cervix is not so likely to show a good picture of gonococci, but any pus from Bartholin's gland usually will show many Gram negative intracellular diplococci. A good Gram staining method is Jensen's.[1] It is difficult to diagnose chronic gonorrhea in women and even more difficult to determine when it is cured, as all tests may fail in gonorrhea in women until another male is infected.

Gonorrhea in women can be cured if the coöperation of the patient can be obtained. Routine treatment will clear up most cases without complications if the disease has not already spread to the tubes or produced a severe inflammation of one of Bartholin's glands. The routine of treatment should combine simplicity with efficacy, and preferably not necessitate more than one treatment per week.

Tests of cure are unreliable as the gonococci are not found in smears long before the patient is cured, and complement fixation tests are still less dependable. So we have to rely upon clinical findings such as the absence of any areas of inflammation or abnormal discharge.

SYPHILIS

The diagnosis of syphilis by laboratory methods is the most accurate and satisfactory diagnostic procedure in the clinic. Every patient coming to the clinic should have blood taken for a Wassermann. Suspected primary lesions will in most cases give a positive Wassermann reaction, but one should not wait for this test, for of course in the very earliest stage the Wassermann is negative.

If primary syphilis is suspected, a darkfield examination should be made immediately. A good grade of darkfield equipment should be used or the diagnostic effort will be worse than useless. The combined light and substage commonly known as the Army Medical School type is mentioned only to be condemned. It is best to try out the type of darkfield offered by a manufacturer on mouth spirochetes before purchasing. A cardioid condenser that fastens securely to a rack and pinion substage is part of a satisfactory equipment. A special darkfield objective such as the 60X apochromat with iris diaphragm of Zeiss is little more expensive than the ordinary objective with a separate funnel stop but is much more satisfactory to use. The very bright concentrated filament lamp is more convenient and cheaper than most arc lamps.

The persons using the darkfield should thoroughly digest the directions which should always be supplied by the maker with any form of darkfield. If the spirochetes appear as a row of dots instead of like a corkscrew, the operator of the apparatus is ignorant of the method used for that particular type of darkfield, or the equipment is poor. In either case it is inexcusable and dangerous to attempt to make a diagnosis by such means.

A sensitive Wassermann test will confirm the darkfield findings in 90 per cent of the cases at the time they arrive at the clinic. A negative Wassermann is probable with most sores of less than 10 days duration, but very improbable after the third week of the sore. If the darkfield is negative, the Wassermann should be repeated every week until 5 weeks from the date of the appearance of the sore, and it should be repeated again 1 month or 2 months later before the patient should be assured that he is not infected with syphilis.

A carefully made sensitive Wassermann reaction is still the most accurate diagnostic serum test for syphilis, even though a few laboratories are now doing only a flocculation test. Most of the flocculation tests not only are less sensitive than a good Wassermann test but also are more liable to produce false positives. The simplest flocculation test is Dr. Kline's microscope slide method with his new antigen, which is almost as sensitive as the most sensitive Wassermann, but in

my hands has occasionally produced a weak reaction in the absence of syphilis.

No matter what blood test is used for syphilis, a single positive report should never be considered alone as proof of syphilis. Two positive reports should be received before accepting the Wassermann as proof of syphilis. Three or more weak positives or doubtful tests are necessary as good evidence of syphilis. With continued doubtful reactions, a lumbar puncture may disclose a spinal fluid with an increased cell count and a positive Wassermann. Not only should all positives or doubtfuls be repeated, but all negatives also should be repeated when there is contrary evidence. The repetition of all positive or doubtful reactions should be an automatic routine arranged by the clerk.

The infectious cases of syphilis usually will have either a positive darkfield or positive blood test. The primary lesions and early secondary lesions may be proved syphilitic immediately by the darkfield examination and given immediate treatment.

The microscopical demonstration of spirochetes in some cases of secondary syphilis may be very difficult, even though the lesions are very infectious, but the Wassermann will always be strongly positive. The experienced clinician, however, will not wait for the result of the blood examination, but will make a clinical diagnosis of secondary syphilis from typical lesions and institute treatment immediately. A Kline flocculation test, which can be done in less than an hour, if negative, will rule out secondary syphilis in a difficult case, or will be positive in a case of secondary syphilis.

The dangerously infectious cases are required to adopt extraordinary precautions during the first week of treatment to avoid infecting others. During this week they should have their own eating utensils, keep their clothing out of reach of others, and avoid the company of others as much as possible. After this short period of intensive treatment, they are relatively non-infectious, as long as they continue vigorous treatment, and then need not adopt special measures to avoid the ordinary human contacts.

A routine of treatment should be developed in which nearly all of the patients receive the same drug at their weekly visits to the clinic. A convenient method is to divide the year into 4 quarters of 13 weeks each, and to repeat a definite routine course of treatment 4 times a year with no rest period. Such a routine is described elsewhere.[8]

The length of such routine treatment of syphilis necessary to render the patient permanently non-infectious from the standpoint of public health, in ordinary contacts excluding pregnancy, is only 6

months, but it should be the aim of the clinic, as far as its finances will permit, to cure the patient. If the finances are limited it is better to make 100 patients permanently non-infectious than to spend the same amount of effort in attempting to cure 20 patients, or, as would be more likely, to confine the attention to only 10.

If cure is the aim, the earliest case should receive at least a year of treatment after the blood (and spinal fluid) Wassermann or Kahn test has become negative and remains so. If a specially sensitive Wassermann or Kline flocculation test is used, possibly a 6-months period of continuation treatment with continued negative tests is sufficient. No patient however early he is treated should receive less than a year of vigorous treatment.

CHANCROID

A diagnosis of chancroid uncomplicated by syphilis should not be made and treatment of any kind should not be given until at least two negative darkfield examinations have been obtained. The diagnosis of uncomplicated chancroid is made by demonstrating the absence of spirochetes and the presence of the Ducrey bacillus in serum from the edge of the ulcer.

SUMMARY

The success of a venereal disease clinic will depend upon the interest of the community, the health department, and the local physicians. The enthusiasm and energy of a single individual, especially a good follow-up worker or nurse, is often responsible for clinic efficiency.

Clinic efficiency with limited funds is dependent upon the adoption of simple rules or routines of treatment. The physician in charge of the clinic must be careful not to fall into the rut of merely making diagnoses and giving treatment. The value of the clinic is dependent primarily upon the number of early cases and sources of infection brought in and rendered permanently non-infectious.

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NOTE: Reprints of the complete article, including methods of treatment of the venereal diseases, may be obtained from the author.

Health Education Program in a City of 100,000*

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WHAT ARE your public health education program and budget? This question was asked of health departments in 26 cities of 100,000 population. The replies were interesting. Few seemed to know what the question meant. All of them disclaimed any special health education service, save certain cities whose programs were supplemented by county or outside funds, and were therefore, not thought representative of cities of this size. Some took the query to refer to work done in public health nursing, others to health education in the schools, and still others thought it had some connection with the issuing of annual reports or the work of a communicable disease bureau. A few mentioned occasional newspaper articles, the publication of bulletins and special pamphlets, and the delivering of health talks. Each of their answers was right in part.

For the purpose of this discussion we shall fence off under the title "health education" only the territory represented by the services of the department of health. The question, then, is how can we make the health information existing in every health department more readily available to a given community?

Sales experts tell us that mass selling is the quickest and most economical way of reaching the public. Mass selling, when connected with a department of health, becomes an interpretation of health facts on a city-wide basis. How can we incorporate this feature then in our health department program? The U. S. Public Health Service and the American Public Health Association consider that mass selling or a health educational program may be conducted more effectively in a city of 100,000 if it is developed and carried on under the immediate supervision of a trained and experienced director who shall work under the close supervision of a health officer. Whether this service be included under the head of a separate bureau or whether it be a subdivision in the administrative department, is a matter for each health department to work out for itself; but that it should exist in some form

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in a city of 100,000 population seems to be an established opinion.

Our next task is to finance this division or bureau and set it off with a program of action. The American Public Health Association, in its publication, *Community Health Organization,* states that the budget for health education in a city of 100,000 may be set at $4,200. A relatively low figure, $2,200, is assigned from this amount as the salary for the assistant in charge, and $2,000 as the modest allowance for printing and other incidental expenses.

Turning to *Public Health Bulletin No. 164,* published by the U. S. Public Health Service, whose chapter on health education is written by Harry H. Moore, we find $9,300 suggested as the minimum expenditure consistent with a reasonably adequate program for an average city of 100,000. The figure is divided in the following way: $3,500 as salary of the chief of the bureau; $1,800 for an assistant, and $4,000 for printing, exhibits, and other incidental expenses connected with the service.

Which is right? The average commercial house assigns from 2 to 5 per cent of its budget for publicity and advertising. Health education represents the publicity and advertising service of the health department.

If we accept the American Public Health Association's estimate of $217,090 as the budget for all activities of a health department in a city of 100,000 for a year, we find that the amount allotted by this same organization to public health education represents 1.9 per cent of the total health department budget, while the amount proposed in *Bulletin No. 164* equals 4.2 per cent of the total budget. The estimates of our authorities, therefore, range from approximately the minimum advertising rate to some degrees below the maximum one.

Meditating upon these budgets we are forced to admit that the average city of 100,000 which, in the year 1927 has no clearly conceived notion of health education as a separate service of the health department, will be much more inclined to adopt the smaller than the larger budget, no matter what advantages we may list after the $9,300 figure. Assuming that $4,200 is the allowance, what is its purchasing powers? Let it be understood that the budget figure covers only current expenses, office space being provided for the health education service as well as necessary permanent equipment.

QUALIFICATIONS OF HEALTH EDUCATOR

A health education program to be successful must be directed by a person of adequate training and experience. Who is the right person? The right person for a health educational job in a municipal health

department should have a sense of news values and the ability to translate technical material into popular terms. As this is an age of training, we shall not choose the health educator by chance but shall select a person for this position who has had a college education and some training in general publicity and advertising. A good newspaper person may be induced to take a short course in publicity and advertising in some of our universities and so prepare for the position, but experience alone in newspaper work is not enough to make the all-round health educator. There must be special preparation for the job. To these qualities add diplomatic salesmanship, without which all other attributes fail.

Demanding such qualifications it is evident that the salary allotment of $2,200 is not likely to procure a person so equipped, and endowed. For that reason a suggestion is made to appropriate $3,000 for the salary of a director of health education. The services of a clerical assistant for one week each month will cost $300. This secretary may be procured from the staff of the health department or engaged outside.

Having paid off our personnel, we find we have $900 left in our budget. How much of a health educational program can we buy with this limited allowance?

NEWSPAPER MATERIAL

First and most important is the preparation of material for the daily press. Through this medium the health educator reaches more people than in any other way. To get the most out of opportunities offered, the health educator will map out for himself a program like this: Visit each bureau of the department of health daily in search of news material. Couple the news with health educational facts. Train staff of health department in acquiring a "nose for news." Watch for good news pictures of health activities for a good news picture is worth more than the average news story. Prepare feature stories for local papers frequently on some health activity. Keep in close contact with the city editor, the managing editor, the editorial writer of each paper, and with reporters. Hand in to editorial writers interesting topics for discussion. Keep in close touch with the advertising department of each paper because often through them valuable health copy may be inserted in the space of large advertisers. With their coöperation issue special health numbers from time to time to be floated by advertising—the department of health furnishing the copy and censoring the advertising of these numbers. Do not forget the children. Write stories on health for them at regular intervals and publish in local papers. Send health articles to the foreign papers and all house organs.

The second phase is the organization of a lecture service. Through this service the department of health keeps the various clubs, churches, labor groups and other civic organizations in the community in touch with its individual and community program of public health. The service is without charge. The speakers should be the best authorities the community affords on the various phases of health work and disease prevention. The lecture service may be announced verbally by the health educator to the organizations themselves or through the newspapers or by mail, or through all of these ways combined. Each health talk furnishes a news item and serves not only to get over the desired health information but to keep this service constantly before the public. To add the value of visualization to the service, motion picture films may be used. These films may be borrowed from many of the state departments of health and from some of the large insurance companies without charge. If the health department does not own a motion picture machine, it is quite possible to borrow one, or to get some civic organization to donate such a machine. Health talks for adults and health stories for children at the bedtime hour may be broadcast over the radio. They may be told also in the weekly story-hour at the library.

Balancing the ledgers we find that this part of the program is included under the service of the health director, although a minimum charge may be incurred if organizations are notified by mail of the speakers' bureau activities. This amount we shall take from the allotment set aside for postage and office supplies.

MONTHLY BULLETIN

The third consideration is the publication of a monthly bulletin to reach an audience composed of physicians, nurses, social workers and other persons in the community. With a limited budget it seems advisible to mimeograph the bulletin in the health education office. Wide margins, frequent and inviting captions and fitting illustrations may be employed to attract the eye and induce reading. The bulletin may take the form of a news letter from the commissioner of health, or be a digest of health activities. A brief statement of prevailing communicable diseases with comments should be included in either type of bulletin. Fifteen hundred bulletins in a city of 100,000 will be adequate for the interested groups. For this service an allotment of $510.49 is made. This figure includes the cost of paper, stencils and ink and printing the address of the department of health on every envelope. It purchases the best grade of mimeograph paper. The stencils are cut and run off by the clerical worker assigned to the service. The bulletin is sent out

in a 2 cent stamped envelope. This insures both better postal service and better attention on the part of the addressee. It means that if the bulletin for one reason or another is not delivered, the post office will return it to the sender. In this way the health department is able to keep its mailing list up-to-date. The stamped envelopes are included in the figure quoted for the bulletin.

ANNUAL REPORT

The annual report is the fourth problem. To help in budget saving the report can be mimeographed in the office on letter-size paper. It should be bound in a cover of heavier paper and bear a printed title. The estimate of $48.60 for a 60-page report is based on an order of 100,000 copies for circulation among the administrators of the city government and a small selected group of interested citizens. To bring this report to the attention of a large number of city taxpayers, the health educator will make a more or less popular digest of it for publication in the local papers.

EXHIBITS AND POSTERS

As a large group of people either never read the newspapers or confine their attention solely to the headlines, or certain features, we realize that exhibits and posters have a decided part to play in every well organized health educational program. To make our budget go as far as possible we seek the assistance of the art department in our schools. A health poster contest is staged among the school children. This insures both publicity and posters. In order to get the necessary exhibits for our work, help is asked of the manual training department in the schools.

Exhibits and posters made in any of the following ways may be used in store windows, shows, fairs, schools, clinics, business and industrial centers. If it is impossible to secure the coöperation of the art department in the schools for posters, pictures may be clipped from magazines and mounted, and appropriate health messages attached. A corner for health books in the public library may be arranged. Ingenuity and a knowledge of mass psychology rather than expense are the factors which determine the success of exhibits. To this phase of our program we allot $40 to be used in captions for exhibits, mounts for posters, and the purchase of posters if such are needed.

POPULAR LEAFLETS

Now we have $300.91 of our budget unspent. We need popular health leaflets for our lecture groups, our clinics, and to answer many inquiries that come into the health department office. Our budget is too

limited to enable us to print our own circulars, but most state departments of health have leaflets that may be obtained at a nominal cost. Many insurance and large commercial concerns also have literature which they are glad to distribute without charge. The difficulty lies in the fact that many of the publications offered are drab and uninteresting in form and not likely to intrigue public reading, although there are notable exceptions. Moreover, one has always to watch one's step in regard to these publications to see that the advertiser does not place the wrong emphasis on the value of his product. In many health departments there is a distinct aversion to using advertising of any kind. When this feeling exists it makes the task of the health educator a difficult one. Illustrations and snappy titles used on mimeographed sheets of health facts will be found an aid in intriguing public interest. For this service, which is a most important one, we allot the sum of $80. This leaves us $220.91 for necessary office supplies and postage.

As you think over the program you will see that each saving of a dollar has meant extra exertion on the part of the health director and has consumed much time—time which perhaps might better be spent in making more vital contacts. With an increased budget more attention could be given to working out the main features of the program; the monthly bulletin might reach a large audience if the needs of the community seemed to demand this, or the popular bulletin of the American Public Health Association might be adopted and given wide circulation; the annual report might be put into more valuable and lasting form; publications for the various clinics and services of the health department might be issued to meet better the needs of the community.

Every program in health education must be adapted to the place it is to fit. It is well to remember that the person whose nose is too close to the grindstone is apt to miss many opportunities. The budget we have discussed is submitted as a minimum budget for a health education program in a city of 100,000. It is our expectation that the health educator will so sell this service in a few years time that the city fathers will grant the health commissioner an increased fund for carrying on a work so vital to 100,000 of its city's inhabitants.

Endemic Goiter and Public Health*

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ENDEMIC GOITER with its varied manifestations and biological effects upon the human race is an interesting study. We have volumes on this age old disease giving the theories of its origin, its effects on the individual and his descendants and the various methods of treatment from one generation to the next. The purpose of this paper is to correlate briefly the facts regarding this disease at the dawn of our scientific medical era, to interpret the findings through the last century in the light of our present knowledge, and to point the way for progress. We are not thinking in terms of curative medicine, which was the viewpoint for centuries, but always in terms of preventive medicine.

Iodin was first used in the treatment of this disease by Dr. Coindet [1] when he painted goiters with tincture of iodin in 1820. His results and teaching were sufficient to establish permanently a relationship between iodin and goiter.

In 1850 Professor Chatin [2] of the University of Paris stated that goiter was due to a deficiency of iodin in air, water and food. However, he could not demonstrate this deficiency and his theory was not generally accepted. Then in October, 1858, before the Imperial Academy of Medicine in Paris, a symposium was held on the treatment of goiter with iodized salt. The authors of this meeting, Dr. Rilliet [3] of Geneva and Dr. Boinet [4] of Paris, refer to the work of Dr. Grange of Geneva, who had given before the Medical Society of Geneva his theory on the cause of goiter and advised the use of iodized salt, which he had used several years (one part of iodid potassium to 10,000 parts of cooking salt), as the best method of preventing as well as curing the tumorous enlargement of the thyroid gland.

In 1867 Saint-Lager [5] published his first volume on endemic goiter and cretinism, and his second volume the following year. This work represents a personal study of many sections of France. The so-called goiter districts were studied as to geological formation, drinking water and vegetation. He believed in general that where the drinking water traversed calcareous soil there was little or no goiter, while in districts where it traversed sandstone deposits goiter was prevalent. He also agreed with the old idea that it is a water-borne disease, but was never

* Read before the Sixth Annual Public Health Conference, Lansing, Mich., December 2, 1926.

able to estimate the etiologic factor. With the new idea that goiter is due to a deficiency of iodin, Saint-Lager had little sympathy, and his criticisms had considerable weight in discrediting this theory. He writes: "Chatin, the originator of this theory, found that in the plains of the River Po goiter was very frequent, yet the air of these plains contains notable quantities of iodin." Saint-Lager does not tell us how he measured this air for its iodin content.

In 1874 Sir William Gull [6] described in detail a case of myxedema, calling it a cretinoid state supervening in the adult life of women. He stated that this symptom complex was due in some way to a lack of function of the thyroid gland. This is the first scientific statement regarding the functions of the thyroid, and our studies from this period on have to determine accurately the physiology and biochemistry of this important gland. In 1883 the surgeons, Kocher and the Riverdin brothers, got exactly the same symptom complex as a result of total thyroidectomy. This strengthened Gull's theory, and when a few years later McKenzie and Murray showed definite improvement in a case of Gull's disease by feeding a glycerinated extract of sheep thyroid, this theory was considered as established. It still stands out as one of the fundamental facts showing the influence of the thyroid on general metabolism. In 1892, Magnus-Levy showed in a very scientific manner that the thyroid controls the rate of heat production, and that in cases of exophthalmic goiter heat production is markedly increased while in so-called Gull's disease it is markedly decreased.

In 1888 William S. Halsted [7] with experiments on dogs had shown that if you remove as much as three-fourths of the thyroid, the remaining one-fourth undergoes a hyperplasia and hypertrophy that is histologically the same as is seen in goiter formation. Also during these experiments he found that, while the thyroid in a pregnant female dog was enlarging, the pups' thyroids were undergoing hyperplasia and at birth were definitely enlarged.

In 1895 the relation of iodin to the thyroid gland was again emphasized when Baumann [8] of Freiburg found by chemical analysis that the thyroid contains iodin; yet the full significance of this discovery was not appreciated for some years. In 1902 the further studies of Baumann and Roos showed that when iodin is stored in the thyroid it combines with the globulin to form what they called thyroglobulin.

Our detailed information on the physiology and biochemistry of the thyroid was worked out by Marine and his associates. Marine and Williams,[9] studying the histological changes which constantly take place in the formation of goiter, found a definite cycle of changes which is the same for all animals studied. A fall in the iodin store always

precedes any cellular changes. Then comes a decrease in the stainable colloid, followed by change in shape together with multiplication of cells (active hyperplasia) and glandular hypertrophy. They repeated the experiments of Halsted and found that we can remove as much as five-sixths of a dog's thyroid and if the remainder be kept saturated with iodin the cellular changes, which heretofore had been constant, do not occur.

During these experiments they also showed the relation of iodin deficiency to congenital goiter. A female dog with three-fourths of the thyroid removed was permitted to become pregnant and was kept on a diet low in iodin. At birth all of the pups had enlarged thyroids showing the same histological changes as are seen in early goiters. Also the iodin content was below normal. This same female dog was again permitted to become pregnant and was this time given a definite amount of iodin each week so that her thyroid remained normal in size. At birth all of these pups had thyroids normal in size, in histological structure and in iodin content. This experiment has been repeated several times and is of fundamental importance in the prevention of endemic goiter.

In Marine's [10] series of different animals, including dog, rabbit, pig, ox and man, the amount of iodin required to keep the thyroid normal seemed to be very constant. The maximum amount of iodin found in normal thyroids was approximately 5 mg. per gm., with an average of 2 mg. per gm. and a total of 40 mg. for the normal adult human thyroid. As long as the iodin content remained above 1 mg. per gm. of dried tissue, no cellular changes would be found, but as soon as the iodin content fell below 1 mg. per gm., or 0.1 of 1 per cent, active hyperplasia and hypertrophy took place. From these experiments Marine states that the normal function of the thyroid depends entirely on iodin. From these same studies came the now famous dictum: Simple goiter is the easiest known disease to prevent.

Although as early as 1870 the farmers of Michigan were preventing endemic goiter and cretinism in their sheep by the use of crude salt from a certain district, yet they did not appreciate what they were preventing or how it was accomplished. The first systematic effort to prevent goiter in animals was applied to the fish-raising industry at the State Fish Hatcheries at Shady Grove, Pa., from 1909 to 1910.[11] Here an exceedingly small amount of iodin in the water controlled what had come to be known as a serious endemic goiter problem. They are still carrying on this prophylaxis by the use of food rich in iodin twice weekly. This work, which is too well known to be recorded here, proved the fundamental truth of the hypothesis, and gave conclusive

evidence that goiter in animals can be prevented by the administration of a small amount of iodin.

Endemic goiter had been repeatedly stressed as a deficiency disease, and we had stated that there is a definite deficiency of iodin in food and drink in the so-called goiter districts, but a systematic effort at prevention in man was not undertaken until the fall of 1916. This work was started by Marine and Kimball [12] in the schools of Akron, O.

There were 2 important reasons why this work should be started throughout public schools: First, the future of this health measure depends entirely upon the education of the community as a whole; second, in our public schools we have the children at the adolescent period when, as we know from common observation, goiter is most prevalent. Therefore, with the coöperation of the authorities of the Akron public schools, a survey was made of the girls only, from the fifth to the twelfth grade inclusive. Our survey showed that 56 per cent of these girls had definite thyroid enlargement. For practical purposes we did not at that time call anything goiter which could not be easily demonstrated. This means that 56 per cent of these girls had visible goiters. Our plan of prevention was to saturate the thyroid gland twice a year, spring and fall, and to this end we gave each girl, who must volunteer and also show a permit from the parent, 3 gr. of sodium iodid daily in the drinking water over a period of 2 school weeks (10 days), each November and April during the next 4 years.

Of the 2,190 pupils taking 2 gm. of sodium iodid twice yearly, only 5 developed thyroid enlargement; while of 2,305 pupils not taking the prophylactic, 495 developed thyroid enlargement. Of 1,282 pupils with thyroid enlargement at the first examination who took the iodin systematically, 773 thyroids decreased in size; while of 1,048 with thyroid enlargement at the first examination who did not take the prophylactic, 145 thyroids decreased in size. These figures demonstrate in a striking manner both the preventive and the curative effects.

Following the publication of the work in Akron, Klinger [13] started the prophylaxis throughout the schools of Zurich. Early in 1921 his reports showed even more curative effect in this district than we obtained in Akron. He worked in schools, however, where the incidence of goiter varied from 82 to 95 per cent, while our highest incidence was only 56 per cent. With such a high incidence his results necessarily deal more with the curative effect. Thus of 760 children, 90 per cent were goitrous at the first examination, but after 15 months 643 who were reëxamined showed only 28.3 per cent goitrous. During these months each had received 10-15 mg. of iodin each week, using the iodostarin tablets.

TABLE I

RECORDS OF PUPILS TAKING AND NOT TAKING PROPHYLACTIC TREATMENT

	Taking		Not Taking	
	Totals	Per Cent	Totals	Per Cent
Normal				
Unchanged	906	99.8	910	72.4
Increased	2	0.2	347	27.6
Slightly Enlarged				
Unchanged	477	41.9	698	72.8
Increased	3	0.3	127	13.3
Decreased	659	57.8	134	13.9
Moderately Enlarged				
Unchanged	29	20.3	57	64.0
Increased	0	0.0	21	23.6
Decreased	114	79.7	11	12.4
Total	2,190		2,305	

Prophylaxis through the schools was adopted by several Swiss cantons, and the Swiss Goiter Commission after a study of the problem decided that the iodin deficiency should be met as a food problem and soon advocated the use of iodized salt. The use of their so-called Standard Salt was begun in the canton of Appenzell in February, 1922, and just a year later it was extended to the cantons of Zurich, Luzern, St. Gallen and Thurgau. Phophylaxis in the district of Appenzell has been under the close supervision of Dr. Eggenberger.[34] The salt has been examined in his laboratory at Herisau, and during the last four and a half years he has made 2,700 iodin determinations. He has also pointed out some very definite results. He states that before the use of Standard Salt at least 50 per cent of the babies in Herisau were born with a definite, palpable, visible enlargement of the thyroid gland. In the last 3 years he has followed carefully 260 cases without seeing a single congenital goiter, the only prophylaxis being that the mother had used Standard Salt before and throughout the entire period of pregnancy. He further states that in 1922 in the 6-year old child the average thyroid gland surface was 26cm2. This sank from year to year to 16, 11, 9, and in 1926 it was only 7cm2. In children of the same age in goiter free zones it was 5-6cm2.

In 1921, Dr. Muggia[35] started the prophylaxis of goiter in the district of Sondrio in northern Italy by giving once a week a ¼ gr. tablet of sodium iodid. His results were striking, as he was working in a district where the incidence of goiter is high. At the end of the school year in 1924 his tabulations include 51 communes, showing more than 18,000 pupils taking iodin (10 mg. chocolatines) regularly. In December, 1924, iodized cooking salt (one part in 100,000) was introduced as a prophylactic measure.

In 1925 iodized cooking salt was introduced into Derbyshire, England, and into New Zealand.

During this same period we have carried out goiter prevention in this country by various means. There being no federal commission in the beginning, the work was taken up by the various states according to the method which seemed best to meet their plan of education as well as prophylaxis.

In West Virginia, during the summer of 1922, the prevention of goiter was presented before many of the county teachers' institutes, and during the school year of 1922-23 more than one-third of the schools of West Virginia, city, village and county, carried out prevention by giving every girl and boy who volunteered 1 iodostarin tablet each week. The teachers were also telling them that goiter is a deficiency disease and that it is the easiest known disease to prevent. In general, they taught the people of West Virginia the cause of goiter and the fundamental principles of prevention.

During the same year, practically the same program of prevention and education was started in the schools of Grand Rapids, Mich. The next year, beginning in September, 1923, the state of Washington, with the supervision and direction of the State Health League, started the prevention in one school system in each county, either at the county seat or in an important city. Each child who volunteered was given 1 iodostarin tablet a week.

One of the most important surveys that have been made in this country was that carried out by the State Health Department of Utah in 1924. The first report shows that 71,201 school children were examined. Of these, 31 per cent of the boys and 54.4 per cent of the girls had goiter. By the end of that school year 10,000 children were carrying out the prophylaxis by the use of 10 mg. of iodin once a week, and this work has been extended very greatly since that time and will ultimately include the whole state.

New York has an endemic goiter problem in only 5 of her northern counties. The state health department has encouraged each county health department to carry on instruction as well as some preventive measure. Syracuse has given this instruction together with the opportunity for each child to get an iodostarin tablet (10 mg. of iodin) each week. The general use of iodized salt throughout these counties is now being urged.

In 1924 the Michigan State Health Department [36] made a complete goiter survey of 4 counties of Michigan, beginning on Lake Superior with Houghton County and continuing with Wexford, Midland and Macomb in a diagonal line across the state. In addition, the iodin content of the water supply of each county was determined. Stated briefly, the incidence of goiter was found to be inversely proportional to the

quantity of iodin in the drinking water. In Houghton County, where 13,725 children were examined, it was found 58.1 per cent of the boys and 70.5 per cent of the girls had goiter. The iodin content of the water supply of this county was exceedingly low, a mere trace. In Wexford County, 47.6 per cent of the boys and 63.4 per cent of the girls were goitrous; the iodin content of this water was slightly higher than that of Houghton, being 50 parts per 100 billion. In Midland County, 24.4 per cent of the boys and 41.1 per cent of the girls were goitrous; the iodin content of the water supply of this county averaged 730 parts per 100 billion. In Macomb County, where the iodin content of the drinking water averaged 880 parts to 100 billion, the incidence of goiter was 20.1 per cent of the boys and 32 per cent of the girls.

Immediately after this complete survey, the state health department undertook the gigantic problem of educating the entire state by giving these facts, together with suggestions for the prevention of goiter. To this end an appropriate letter was sent to each member of the medical profession, to school authorities, and through the schools to the parents throughout the entire state. By coöperation among the salt manufacturers, the wholesale grocerymen and the state health department, it was agreed that after May 1, 1924, an iodized salt which should contain 1 part of sodium or potassium iodid to 5,000 parts of table salt would be sold throughout the entire state. This program has been carried out consistently, and it is estimated that in some counties up to 95 per cent of all the table salt used is the iodized salt.

We have had the opportunity of making a resurvey in Wexford County only. This was made in October, 1925, and showed that the incidence of goiter had decreased just 25 per cent in 18 months. The only method of goiter prevention employed in the county during this period was the use of iodized salt.

When the work was started in Akron, we had no standards to guide us, but we used the amount which we considered sufficient to saturate the thyroid gland and at the same time be well within the province of safety. The exact amount necessary to prevent goiter was being considered. From Marine's studies of physiological needs we estimated that approximately 200 to 300 mg. per year of iodin is used by the normal adult. It was from these estimations that we suggested the use of 10 mg. of iodin a week throughout the entire school year of 40 weeks. This is higher than the amount recently advocated by Breitner [37] of Vienna, who concludes that, to meet the physiological needs of iodin and prevent goiter, each individual need have only 2 mg. of iodin a week, or 100 mg. a year.

Since McClendon [38] improved the method of determining exceed-

ingly small amounts of iodin in 1922, considerable work has been done on actually measuring and comparing the amount of iodin in the water and food in so-called goiter districts and goiter free districts. McClendon has made sufficiently widespread determinations of the iodin content in the water supply to map out practically the whole United States according to a very low or a comparatively high iodin content in the water. The water of Lake Superior and the surrounding districts contains, according to accurate chemical analysis, approximately 1 part of iodin to 100 billion parts of water. By the same analysis the water in the lower Mississippi valley contains 10,000 to 15,000 parts of iodin to 100 billion parts of water, and some of the deep wells of Texas show more than 18,000 parts.

The iodin content of water is only a fair index to the iodin content of the food raised in these districts, and by careful estimations the iodin content of vegetables and grain is from 100 to 1,000 times larger in the so-called goiter free sections than it is in the Lake Superior region, which is one of the districts most severely afflicted with goiter.

By chemical analysis, McClendon measured the iodin content of the food and drink of an average sized normal young man (goiter free) for a period of 3 days. He also measured the amount of iodin excreted by the body during the same period. The intake of iodin was 0.057 mg. and the amount excreted for the same period was 0.021 mg. From this we have a retention of 0.036 mg. in 3 days, or an actual retention of 0.012 mg. of iodin every day.

Von Fellenberg [29] in Germany performed on himself an iodin metabolism experiment covering a long period. His food intake was at first not normal but intentionally low in iodin. In the latter part of the experiment iodin was added in the form of potassium iodid or cod-liver oil, sardines, watercress or butter. Von Fellenberg's low iodin diet contained 0.0143 mg. a day. He excreted about the same quantity. On adding iodin in various forms to this basal diet, he increased the excretion but not to the extent of intake, so that he obtained a positive iodin balance. From this experiment we find that the body uses up or excretes a definite amount of iodin regardless of the intake. We can state that an average sized young adult with normal metabolism and a minimal amount of physical exertion, all factors being reduced to a minimum, still excretes 0.0143 mg. of iodin daily. From the amount of iodin in the water and common foods of our goiter districts, McClendon estimates it would require 10 years for a normal adult to accumulate 40 mg. from these natural sources. This 40 mg. is the average amount that Marine found in normal adult thyroids.

That endemic goiter may be prevented by the general use of a food

rich in iodin has been shown by Jarvis, Clough and Clark [20] in their study of goiter in the Pemberton valley, British Columbia. Endemic goiter and cretinism have been very prevalent among the white settlers and their domestic animals in this valley, yet no cases of goiter could be found among the inhabitants of an Indian village located on the same spot in this valley since many years before settlement by the white man. These authors conclude that the Indians, also their pigs, get sufficient iodin to keep their thyroids normal from the large amount of salmon that is annually consumed.

SALT AS A NATURAL SOURCE OF IODIN

During 1921-22 Hayhurst [21] was pointing out that our common table salt has been the source of important food elements, especially iodin. He believes that our present-day methods of refining, whereby every trace of iodin is removed, have in some sections played an important part in the increasing incidence of endemic goiter. Convincing evidence of the truth of this teaching was found in our study made in West Virginia, more especially in the Kanawha River valley. In the spring of 1922, when surveys were made to determine the incidence of goiter throughout this section, we were told by several of the older physicians in Charleston that before 1900 endemic goiter was an exceedingly rare entity in this valley, but that soon after this date all the doctors had noticed a definite increase in simple goiter, and our survey of the schools of Charleston and Huntington showed that 60 per cent of the school girls had enlarged thyroids. This was indeed a challenging problem, and with the assistance of the state health department we found after considerable study that the condition as just stated was exactly true of the section, and that the only change in food or water was in the table salt. Until about 1900 all the table salt used in this valley came from salt wells in this region, and even today you can see along the river old shacks that 25 years ago marked a salt well. It is within the memory of every citizen 50 years of age that the table salt mined and used in this vicinity was a crude salt, described by everyone as being coarse and containing dirty brown particles. In 1898 the salt companies of Ohio and Michigan worked out and put into actual practice the new process of refining crude salt, as a result of which this whole section was within a few years flooded with pure fine white salt. Naturally, the local salt companies with their crude, dirty brown salt could not compete. As stated previously, the only change in food or water was in the supply of salt. It followed that within a quarter century the incidence of endemic goiter was as high in this valley as around the Great Lakes.

We find a similar interesting clinical study of prevention of goiter by the use of an original salt rich in iodin reported by Heinrich Bircher in 1875-80. His comparison of the incidence of goiter in different cantons of Switzerland was most striking. This study was interpreted more fully by H. Hunziker [22] in 1915, from whom we get important data. He found that, from 1870 on, the chemists at the salt mines in the region of Bex (Switzerland) had made careful report on the iodin content of this salt, which is unusually rich in iodin. He also found that the canton of Waadt, either by accident or design, had obtained and still holds a complete monopoly of the salt from this district. Incidentally, the neighboring canton of Freiburg procured its salt from an entirely different source, which by actual analysis has shown little or no iodin since this period. The geology, the physical geography, the inhabitants and the foodstuffs in general in these 2 cantons are practically the same, the only difference being that for 50 years the canton of Waadt had used a salt which contains considerable iodin and the canton of Freiburg had used an iodin free salt. From the army statistics over this period, as shown in Table II, goiter has been 5 times as frequent in the canton of Freiburg as in the canton of Waadt.

TABLE II

RECRUITS UNFIT FOR SERVICE 1875-80

(FROM CENSUS REPORTS)

Waadt	Recruits	Goitrous	Per Cent	*Freiburg*	Recruits	Goitrous	Per Cent
Trey	20	0	0	Torny	18	4	22
Marnand	13	1	8	Chatonnave	23	5	22
Villarzel	20	1	5	Villarimboud	24	4	17
Villars Br.	11	2	18	Villaz St. Pierre	22	11	51
Dompierre	20	1	5	Lussy	16	9	55
Prevonloup	9	0	0	Tomont	110	32	29
Lovatens	15	2	13	Billens	13	2	15
Sarzens	5	0	0	Hennens	10	3	31
Brenles	14	1	7	Villaranon	6	3	49
Total	127	8	6		242	73	30

These two demonstrations from West Virginia and from Switzerland would indicate that in some sections practically our total amount of food iodin is from common salt. It further emphasizes the point that a very small amount of iodin, if used continuously, is able to keep the thyroid gland saturated and thereby prevent endemic goiter. The small amount of iodin that is estimated by McClendon and von Fellenberg as representing the basal needs of the body just about equals that which would be found in the crude salt cited above.

This relationship, as set forth by Heinrich Bircher in 1883 and by the recent studies of von Fellenberg under the Swiss Goiter Commission, has been the basis for the iodin content of the so-called Standard Salt which has been used in Switzerland since 1922. They estimated the average individual would use 5 kilos of salt in a year, or approxi-

mately 11 pounds, while in this country our best estimations have placed the amount used by each person at 7 pounds a year. Their Standard Salt contains 5 mg. of potassium iodid per kilo of salt, which would give in a year 25 mg. of potassium iodid to each individual using 5 kilos or 11 pounds of salt; while in Michigan an adult using 7 pounds of salt (1 part potassium iodid to 5,000 of salt) would get 10 grains of potassium iodid or 400 mg. of iodin, the same as a child getting one 10-mg. tablet a week.

Early in 1921, Sloan [22] advocated the use of iodized salt as a prophylactic, and suggested that one part to 5,000 be used. The immediate result of this suggestion was the introduction of a prepared salt prepared by a wholesale drug house and sold through the drug stores.

POSSIBILITY OF HARM

Since the beginning of preventive work in 1916 through the schools of Akron, we have recognized the possibility of harm, have constantly watch for any untoward effects in our studies, and have had our colleagues do the same. It was predicted by some in 1916 that we should have a regular epidemic of exophthalmic goiter.

This "epidemic" was discussed as long ago as 1858. As previously stated, there was in that year a symposium on the treatment and prevention of goiter before the Imperial Academy of Medicine in Paris. Dr. Rilliet of Geneva stated that he had for several years used iodized salt, one part of potassium iodid to 10,000 parts of cooking salt, following the teaching of Dr. Grange of Geneva. He had used this in the treatment of large goiters in many of his families, and at this time he is reporting 4 cases that presented what we would now diagnose as toxic adenomatous goiter. These were all of longstanding nodular goiters—3 women, age over 60 years, and 1 man age over 45. As Dr. Rilliet expressed it, these members of different families had attained in different degrees an ensemble of symptoms characterized by emaciation, palpitation, acceleration of pulse, general tremor, accompanied with great general nervousness and a marked diminution of strength. All of these cases were cured, however, by "rest, asses' milk and preparations of iron." Some years afterward, Dr. Rilliet goes on to say, the man of 45 passed many weeks at the seashore and was not slow to develop again the train of symptoms already described. He concludes that the patient's second intoxication was from the inhalation of iodin from sea air.

Dr. Rilliet's conclusions sound very much like some we have heard within the last year: (1) The long continued absorption of small doses of an iodin salt mixed in the water, air or food is not always without

danger. (2) The inhabitants of certain localities are more than others exposed to iodin intoxication. (3) This special susceptibility depends perhaps on the small quantity of iodin one receives from the water, the air or the food in these countries. (4) Iodin intoxication is perhaps more likely to do harm when the medicine is given in small doses than in large doses and as a preventive than as a cure of a local and confirmed diathesis.

At the next meeting of the Imperial Academy of Medicine at Paris, October 26, 1858, Dr. Boinet of Paris addressed the Academy in a letter on "Food Iodin—The Intoxication Shown by Dr. Rilliet (of Geneva) Has Never Existed." He accused his colleague of being imposed upon by the "axiom which often misleads, that *post hoc, ergo propter hoc.*" He was also impressed by the fact that only 4 cases had been reported from a country where goiter was very frequent. Since Rilliet states that he had treated many families with iodin, and several of his colleagues were so treating many goiters, why should we see only 4 cases reported? Suffice it to say that this argument was not decided, and has been given here to show the futility of just such arguments within the past year.

After this discussion, the fear of possible danger to a few seemed to carry much more weight than the evidence of benefit to the many, and by 1870 the relation of iodin to thyroid enlargements was practically discredited or forgotten. Now, however, with the background of 40 years of scientific investigation, together with the definite results being reported in Switzerland with their Standard Salt and the data already collected in this country from the use of much larger amounts of iodin, it would seem that the prevention of goiter is on a scientific and safe basis. However, we are seeing reports in our medical literature of cases of exophthalmic goiter in persons who had previously used prophylactics such as iodized salt, and they are spoken of as exophthalmic goiters caused by the use of iodin in these small amounts, without a true appraisal of all the other factors that have been considered etiologic for the past 50 years. The ease with which this fallacious conclusion can be made was emphatically called to my attention during the reëxamination of the children of Marion County, O., in October, 1926. Two girls, age 14 years, with moderate-sized, nodular goiters, were seen who on examination in 1925 had been classed as having moderate-sized congenital goiters. They had both used iodized salt during the entire year, and now showed every evidence of rather severe hyperthyroidism. On further investigation, however, it was found that one had been taking thyroid extract since March, 1926 (7 months), and the other had been started on Lugol's solution in July and after

this had used iodex ointment freely on the neck once a day. This proves nothing against the prevention of goiter, but shows the dangers of careless treatment.

In the work in Akron, if you will consider 2 gm. of sodium iodid over a period of 2 weeks as 1 treatment, then we gave more than 10,000 treatments, and the total of bad results was 10 cases of mild iodid rash with never any symptoms of hyperthyroidism.

In Switzerland, from the use of iodostarin in some cantons for as long as 8 years and the general use of iodized salt in several cantons for 4½ years, Dr. Eggenberger states they have not seen a single case of harm that could reasonably be credited to the general use of iodin in the effort to prevent goiter. In 1926 he made a special study [11] of the few cases in which it was reported that harm had been done by the prophylaxis, and gives this summary: "In Canton Appenzell A.Rh., with under 55,000 inhabitants, in 4½ years there has not come into view a single case of harm from the use of iodin through governmental iodized salt for cooking, although I follow each doubtful case which is mentioned to me by my colleagues. It would be instructive to go through the many sources of error which lead falsely to the diagnosis of iodism. The most interesting was the panic anxiety of a certain person who already had gastric symptoms and palpitation from the salt before it was iodized. In the Swiss statistics there figures a case of alleged death produced by the use of iodized salt in which case it was later known that the patient never had occasion to get iodized salt."

Dr. Muggia reports no bad results from the use of 20 mg. of iodin weekly, and at the close of the school year in 1924, 10,000 children were taking this amount systematically.

Briefly, we have never seen an authentic case of hyperthyroidism in children that could by any stretch of the imagination be attributed to the prophylaxis of goiter through the schools. This point seems agreed upon by all. However, the old argument about longstanding goiters in adults put forth by Rilliet in 1858 seems to live on.

In an attempt to answer the question, a large number of hyperthyroidism cases were studied for a history of iodin intake before onset of symptoms or as treatment for simple goiter. All these cases were seen in the Cleveland Clinic in 4½ years, from March, 1921, to September, 1925. During this time 2,659 cases of hyperthyroidism were studied, and all who had used iodin in any form previous to any symptoms or as treatment for simple goiter by physicians, were listed as cases of induced hyperthyroidism. This report by Kimball [12] was published in the *Journal of the American Medical Association*, November 28, 1925, with the summary given in Table III.

TABLE III

INDUCED HYPERTHYROIDISM

Total number of cases of hyperthyroidism		2,659
Total number of cases of induced hyperthyroidism		309 (11.6%)
Induced by:		
Iodized salt	6	(2%)
Self-medication	37	(12%)
Medical treatment	266	(86%)

It was stated in the article, but with insufficient emphasis, that during this study we had seen many cases of middle age women with long-standing nodular goiters that had developed hyperthyroidism with exactly the same history as the 6 listed in the foregoing table under "Iodized salt," only they had never used iodized salt or any iodin. Therefore, in the case of the 6 the iodin they received from iodized salt is not necessarily an etiological factor; their having used iodized salt and later developing hyperthyroidism is probably only a coincidence.

In the past 6 months we have studied 33 cases of severe exophthalmic goiter, and of this number only 5 had ever used any iodized salt. These 5 responded to the use of large amounts of iodin, such as 500 mg. daily, exactly the same as the 28 others. Also the same factors—focal infection, shock, exhaustion and the history of adenomatous goiter—were to be considered in the 5 as in the 28. And further on this point, Dr. Allen Graham from a close study of the surgical goiter cases in Lakeside Hospital states he has never seen a case where he could say with any satisfaction that the hyperthyroidism was a result of iodin in amounts used in general prophylaxis, especially in iodized salt.

By emphasizing the tremendous harm this public health measure has suffered from unscientific articles in which personal opinion has been given instead of scientific data, we commit ourselves to a program of real investigation to learn the truth of the situation. As a result of surveys, iodin determinations, teaching and encouragement from the State Health Department in Michigan since 1923, we have in Michigan more basic information than anywhere else in the world. If all this information were available, no doubt our big questions would be answered by indisputable figures. Therefore, the next important step is getting and correlating this information.

CONCLUSIONS

Every survey or study only emphasizes the importance of prevention during pregnancy. The relation of these congenital defects to the adenomatous or tumorous conditions of later life is more and more appreciated with each careful study. We all know the disappointments in our attempts to control or treat these tumorous thyroids. Therefore,

we cannot stress this point too strongly, and in endemic districts we need the assistance of all prospective mothers and of the physicians who educate and direct them through this important period. It is during pregnancy that the general use of iodized salt is of greatest value. For those under the supervision of their physicians or those who accept the responsibility themselves, one or two iodostarin tablets a week throughout pregnancy and lactation would be excellent.

The history of this problem for the past hundred years teaches most emphatically that the treatment of goiter is very unsatisfactory and accomplishes little toward the control of the disease. Those attacking the problem from the viewpoint of preventive medicine—physiologists, biochemists and public health organizations—have accumulated sufficient evidence to justify the assertion that endemic goiter is the easiest known disease to prevent. By further detailed study of the fundamental principles underlying the cause and prevention and with the constant application of scientific data by the state health organizations, we should see the fulfillment of our prediction: Within another generation there will be no endemic goiter problem.

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Bacterial Flora of Ground Market Meats*

Outbreak of Food Poisoning Probably Due to Crabmeat

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A BANQUET on September 23, 1926, was attended by approximately 1600 members and guests of a Florists' Association at a large hotel in Chicago. A few hours after the banquet some of the guests became ill. Within 24 hours a large number were affected. The symptoms were abdominal cramps, diarrhea, headache, and in some instances nausea and vomiting.

The Department of Health was not notified of the occurence until September 26, three days later, when an investigation was begun to determine the causative agent. At this time many of the guests had left the city, a fact which rendered it difficult to estimate definitely the number taken sick.

A list of the guests at the banquet was obtained from the local branch of the association; among them were approximately 90 persons who lived in Chicago, and from these, data regarding the number who became ill, the symptoms, the articles of food eaten and not eaten by those who were ill, were obtained.

The data indicated that between 50 and 60 per cent of those present were ill. The information on this point, however, was conflicting. At the same time 1000 guests, not at the banquet, were being served at the hotel. None of these were taken ill. Moreover the hotel management reported no illness on the part of the waiters and other help, a great many of whom had partaken of food served at the banquet.

From the initial survey of the symptoms of some patients, it was decided that the outbreak was probably one of food poisoning. In order to ascertain the probable cause of the outbreak the following procedure was carried out:

* Read at a Joint Session of Laboratory and Food and Drugs Sections of the American Public Health Association at the Fifty-sixth Annual Meeting at Cincinnati, O., October 17, 1927.

1. All those who had prepared and served the food were required to submit to examination by the Department of Health. The results of these examinations indicated that none of the personnel of the hotel were carriers of pathogenic intestinal organisms.

2. A list and history of all the foods served at the banquet was obtained. This was checked against the previous list of foods eaten and not eaten by those taken ill and those not taken ill, obtained from the 90 guests living in Chicago. The survey brought out the fact that the food had been properly prepared and handled in the hotel. It showed that most of those who were not sick had not eaten the sea food canape (containing crabmeat); whereas, those who were sick had partaken of it. It was evident, however, that if the sea food was at fault, not all of it was contaminated.

3. Samples of several of the lots of foods served at the banquet were obtained and examined at the laboratories of the Department of Health. These foods included crabmeat, ripe olives, pineapples, jelly, mushrooms, drinking water and charged water. All save the crabmeat, consistently gave negative results both chemically and bacteriologically. The crabmeat, however, yielded an organism, which on preliminary examination appeared to belong to the *Salmonella suipestifer* group. Members of this group are known to be occasionally associated with food poisoning. It is generally believed that this type of organism is of animal origin and gets into food through contamination by rats, mice, etc.

The organism on further and careful study was found to have the following properties:

Morphology—It was small, Gram negative, non-sporeforming, and sluggishly motile.

Agar Slant—It gave a moist, smooth, translucent, and abundant growth.

Broth—The medium became turbid; there was a thin pellicle and some sediment.

Litmus milk—The medium became acid in 24 hours, and alkaline in 48 hours.

Indol—The test was negative.

Gelatin—Gelatin did not show liquefaction.

Sugars—Dextrose, maltose, mannite, galactose, trehalose, xylose and dextrin were fermented with production of acid and gas.

Arabinose, levulose, and rhamnose were fermented with acid production but no gas.

Adonite, erythrite, inosite, inulin, lactose, melezitose, raffinose, salicin, and sucrose were not fermented.

Culturally the organism resembled the *Salmonella suipestifer* very closely.

In order to ascertain more fully whether the organism might be *S. suipestifer,* it was tested against suipestifer antigen obtained from the University of Chicago and against antisera from rabbits injected with pure cultures of *S. suipestifer,* obtained from the University of Chicago and from the American Type Culture Collection. Six such strains were used to immunize rabbits and yielded sera of high homologous titre for all save one strain. None of these antisera would agglutinate the crabmeat organism. Immune antisera, obtained by injecting washed cultures of the crabmeat organism, failed to agglutinate the pure live strains of *S. suipestifer.* However, the organism was agglu-

tinated by its own homologous antiserum in high dilutions. The results throw doubt upon the theory that the organism is definitely a member of the *S. suipestifer*. However, some workers have found that there are certain strains of this group of Salmonella which do not agglutinate with heterologous antisera of the species.

To test the pathogenicity of the crabmeat organism on laboratory animals the following experiments were carried out:

The organism was grown in dextrose broth at 37°C. for 24 hours; 1 c.c. of the culture was then injected intraperitoneally into mice. Death occurred within 48 hours in 4 of the 6 mice injected. None of the control mice died. Injections of washed suspensions of the organism also resulted in the death of 5 out of 8 mice in 48 hours. The organisms were then grown in a veal infusion broth containing 2 per cent of Witte's peptone, and 0.1 per cent of dextrose with a final pH of 7.2.

Injection of the cultures, filtrates and washed organisms grown in this broth, all resulted in the death of a high percentage of the mice when 1 c.c. was injected.

Again experiments were tried using Berkefeld filtrates heated to 56°C. for 30 minutes. The heated filtrates did not cause the death of the mice injected.

Some of these results were suggestive of a soluble toxic substance. In order to determine whether we were dealing with a true toxin, attempts were made to obtain protective sera against the filtrate of these organisms. It has been shown by Ecker,[1] Geiger, *et al.*,[2] and Branham[3] that members of the paratyphoid-enteriditis group produced soluble toxin-like substances.

Rabbits were therefore injected intravenously at frequent intervals with sterile filtrates of the "crabmeat" organism.

The antisera from these rabbits failed to protect mice injected with the unheated filtrates.

While this work was in progress another investigation was being carried out on the flora of ground meat obtained in the Chicago market. These organisms were isolated by streaking a portion of the sample of ground meat upon the surface of Endo's medium, incubating the plates for 24 hours at 37° C. and picking the colorless colonies from the surface of the medium. The colonies so picked were purified by repeated seeding in fluid Endo's agar at 45° C. and pouring plates for the deep colony method of isolation.

The properties of the 100 organisms thus obtained were studied in the following media: tryptophan water for 5 days at 37° C. to determine indol production, 14 per cent gelatin for 30 days at 20° C. for

FERMENTATIVE REACTIONS

Type of Organism	Gram Stain	Motility	Gelatin	Indol	Dextose	Lactose	Sucrose	Xylose	Dulcitol	Mannitol	Rhamnose	Maltose	Inositol	Salicin	Litmus Milk	Laboratory Numbers
B. Suipestifer group	—	+	—	—	*	—	—	*	—	*	*	*	—	*	±	1-2-5-7-10-11-14-22-30-31-35-51-61-65-69-74-76-80-81-82-85-89-93-94-95-96-100.
	—	+	—	—	*	—	—	*	—	*	*	*	—	+	±	4-21-25-32-34-49-52-84.
	—	+	—	—	*	—	—	*	—	*	*	*	—	—	±	8-13-17-20-24-37-38 41-43-44-45-46-48-58-60-64-70-72-75-77-86-88-90-91-92-98-99.
B. Icteroides group	—	+	—	+	*	—	—	*	*	*	*	—				36-47.
B. Proteus group	—	+	+	+	*	—	*	—	—	*	—	*			+	3-6-9-15-16-33-39-54-59 66-71-78-83-97.
	—	+	+	+	+	+	+	—	—	+	—	*			+	27-28-56.
	—	+	+	+	*	—	*	*	—	—	*	*			+	26-73.
	—	+	+	+	*	—	*	*	—	—	—	*			+	53.
	—	+	+	—	*	—	+	+	—	+	—	+			+	19-29.
	—	+	+	—	*	—	*	*	*	*	*	*			+	40-68.
	—	+	+	+	*	+	—	*	*	*	*	*			+	42.
B. Cloacae group	—	+	+	—	*	*	*	*	*	*	*	*			+	57-62-63-87.
	—	+	+	—	*	*	*	*	—	*	*	*			+	12-18-50-55-67-79.

\+ indicates acid production or positive reaction.

* acid and gas production.

— negative reaction.

± initial acidity, final alkalinity.

Culture 23 proved to be a gram negative Coccus.

proteolytic enzymes, litmus milk and various 1 per cent carbohydrate media for fermentative changes. The reactions were read in litmus milk in 5 and 15 days, while in the carbohydrate media the results were read at the end of 5 days of incubation at 37° C.

Sixty-two organisms of the 100 selected for study agreed substantially in their cultural reactions with the *S. suispestifer* group while 2 gave reactions similar to *Salmonella icteroides*. The remaining organisms were classified in the *B. proteus* and *B. cloacae* groups.

The organisms tentatively classified as *S. suispestifer* failed to agglutinate with a known *S. suispestifer* antiserum of high titre. The known suispestifer organisms likewise failed to show specific agglutination with antisera prepared from 2 of the unknown organisms.

These studies combined with the work of Geiger, Ward and Jacobson[4] on oysters, carried out in this laboratory indicate that there are a number of organisms associated with various foods, but particularly meat products, that are members of the paratyphoid-enteriditis group. Many of them do not lend themselves to classification with any of the better known organisms. Others fall in the classification of the *B. proteus* or *B. cloacae* group. The presence of any of these groups seems

to indicate unsatisfactory sanitary methods of handling of the foods in question and may be responsible for the outbreaks of gastrointestinal nature.

The rôle of these organisms in food poisoning outbreaks has not been definitely determined, but it is apparent that they are potentially dangerous, for it is well known that several of the better known bacteria of these types do cause food poisoning outbreaks.

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The Growth of the Birth and Death Registration Areas*

IN 1924 the slogan was evolved "Every State in the Registration Area Before 1930." When this slogan was first used, there were 31 states in the birth registration area and 38 in the death registration area. In 1925, at St. Louis, a special committee of the Vital Statistics Section was appointed, with Dr. Dublin as Chairman, to aid in the completion of this task.

There has been excellent coöperation everywhere, and as a result of the united efforts of federal, state, city, and welfare agencies of all kinds, not overlooking contributions of over $30,000 from the insurance companies and the Rockefeller Foundation, there are today 40 states in the birth registration area and 42 states in the death registration area. The following 6 states are still outside of the death registration area: Georgia, Nevada, New Mexico. Oklahoma, South Dakota, and Texas. The 8 states still outside the birth area are the 6 just mentioned and Colorado and South Carolina.†

Registration promotion campaigns have just been completed in Oklahoma and Georgia, and these 2 states are now being tested officially by the U. S. Census Bureau to ascertain whether they are registering at least 90 per cent of their births and 90 per cent of their deaths. Other campaigns are now under way in Colorado, South Carolina, and Texas. New Mexico is just ready to start a drive, and we are hopeful

* Report of the Committee to Aid Completion of the Registration Area before 1930, delivered before the Vital Statistics Section of the American Public Health Association at the Fifty-sixth Annual Meeting at Cincinnati, O., October 19, 1927.

† Georgia and Oklahoma have recently been admitted to both areas.

that slight modifications will be made in the registration laws of Nevada and South Dakota at the next sessions of the state legislatures in 1929, so that these states will be able to qualify for admission during that year.

Briefly stated, a successful registration promotion campaign requires two things: (1) A diagnosis of the trouble, and (2) the application of proper remedies.

Diagnosis—A careful study is made of existing conditions in the state in an endeavor to locate the registration defects, whether connected with the state office, the local registrars, or with the physicians and midwives, and to determine whether there is any lack of public sentiment in favor of better registration. Unusually low birth rates or death rates in any section of a state immediately suggest defective registration, though further investigation may prove that such rates are due to other causes.

The names of many delinquent physicians and midwives are suggested by noting in the official registration records that for many infant decedents records of births have never been filed. Many delinquents are revealed by checking against the official birth records independent lists of recent births—lists obtained from the official test cards returned to the Census Bureau and from information given by mothers at county fairs, or from information obtained by women's clubs as a result of a house to house canvass, or from cards obtained by the school census enumerators.

Remedies—Under the direction of the state commissioner of health are gathered together as many capable campaign workers as possible from state, federal, and volunteer welfare agencies. These workers then go to those parts of the state which have shown most defective registration, and endeavor to convert the delinquent registrars, doctors, midwives, and others to a realization of the importance of good registration. While making such tours the campaign workers actually collect hundreds of birth records which have never been filed.

Where publicity is needed, posters are put up in the post offices; articles are written for the press; and the chambers of commerce, the Boy Scouts, and welfare agencies are called upon for help.

In terms of population 87.3 per cent of continental United States is now included in the birth registration area and 91.3 per cent in the death registration area. In terms of area, this would be 72 per cent and 76.5 per cent.

If the task ahead is considered in terms of population, the goal does not seem so far away, but when one realizes that 28 per cent of the land area is still outside of the birth registration area and that 23.5

per cent outside of the death registration area, the magnitude of the task ahead is very evident. In a word, the few states still outside are on the whole so thinly populated that tremendous distances must be covered to reach the people and to sell to them the idea that the registration of births and deaths is desirable. Texas alone is bigger than the combined area of the following group of 13 states: the New England states, New York, Pennsylvania, New Jersey, Delaware, Maryland, West Virginia and Virginia, and the land area of the other 7 states still outside the birth registration area is considerably greater than twice the land area of Texas. A realization of this tremendous area still to be brought within the fold in the short period of two years, will convince anyone that our only hope of reaching the goal on time rests upon the full coöperation of every agency. More workers and more funds are needed.

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Child Welfare in Mexico

THE Government of the Federal District of Mexico began in October to publish a monthly periodical, *El Nine* (The Child), devoted to child welfare. The periodical consists of four sections, which deal respectively with medicine, including pediatrics and hygiene; psychology, including vocational guidance; education; and social welfare.

HE insanitary conditions under which the children of the poorer classes in Mexico City are living have attracted the attention of the Department of Health of that city. The department has ordered its inspectors to visit all homes, particularly those in the working-class suburbs, in order to investigate the living conditions of the children. Measures for the improvement of the situation will be taken according to a plan prepared by the Department.—*El Nine*, Mexico City, vol. 1, No. 2, 1927.

Bacterium Abortus Infection in Man*

The Results of the Agglutination Test Applied to More Than 10,000 Human Sera

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SINCE the work of Evans (1918) proved the close relationship between *Bact. abortus* and *Bact. melitensis*, the possibility that *Bact. abortus* might be pathogenic for human beings has been constantly present in the minds of many investigators. During the past two years approximately fifty cases in which *Bact. abortus* has been incriminated as the causative factor have been reported in the United States. In all these patients, the characteristic symptom has been an intermittent type of fever somewhat resembling typhoid. Very recently one case of infection of the genitourinary tract of a woman has been cited by Belyea (1927).

For several years, the Storrs Agricultural Experiment Station has tested by the agglutination and complement fixation reactions a large number of dairy herds in this state. From the data so obtained, it appears that at least 90 per cent of the herds are harboring *Bact. abortus*. Since the mode of spread of this type of disease has been assumed to be through the ingestion of raw milk from infected cows, it would seem that if the organism itself were pathogenic there should be a fairly large number of human beings in the general population infected with the disease. These may have been diagnosed as suffering from other clinical entities, but the agglutination test applied as a routine procedure in a large number of human sera should give more information on this point.

METHODS

The only method which seemed feasible was the application of the agglutination test using a *Bact. abortus* antigen to the human sera

* Read before the Laboratory Section of the American Public Health Association at the Fifty-sixth Annual Meeting at Cincinnati, O., October 20, 1927.

which were received at the State Department of Health, Bureau of Laboratories, for the Wassermann reaction. Bassett-Smith (1925) tested 130 Wassermann samples in England and found two sera giving positive agglutination in 1 in 40. The objection which might be advanced that these samples coming from persons who showed no real clinical symptoms of *Bact. melitensis* infection might negate the results of the experiment, of course, is valid, but inasmuch as it seemed impossible to obtain numerous sera by any other means, it was the method employed in this work. The results obtained should give some idea of the number of persons in the general population of Connecticut whose sera react to the agglutination test.

The serum was separated from the clot as soon as it was received at the laboratory and after the Wassermann and Kahn reactions were run, it was preserved in the icebox until the agglutination test could be performed. Any samples showing bacterial growth or a large amount of hemolysis were discarded. The antigen employed was made from four strains of *Bact. abortus* coming from different sections of the country whose agglutinability had been carefully checked. These strains were grown for 24 hours on 1 per cent glycerin Fairchild's agar, and from these, transplants were made upon plain Fairchild's agar and incubated for 48 hours at 37°C. The growth was harvested with a small amount of 0.4 per cent carbolized physiological saline and diluted for the final test to a nephelometer 1 on the MacFarland scale. This diluted antigen was distributed in small test tubes in 2 c.c. amounts and the serum added to make final dilutions of 1 - 25, 1 - 50, 1 - 75, 1 - 100. After the addition of the antigen the tubes were carefully corked and shaken, incubated for 48 hours at 37°C. and one reading was made on their removal from the incubator and a second after 24 hours at room temperature. The results were recorded on the 4+ scale, i.e., 4+ indicating complete flocculation and clearing, 3+ and 2+ indicating partial reactions and 0 a non-reactor.

Inasmuch as the names of the patients for the Wassermann reaction cannot be divulged, a number system was used on all samples. Whenever a serum showed 4+ reactions through the 1 - 100 dilution a questionnaire was sent out by the State Commissioner of Health to the attending physician. This asked for the sex, age, and occupation of the patient, a description of the symptoms, whether he had used milk either raw or pasteurized; and requested a second sample and, if possible, a blood culture. Whenever a second sample was received, the dilutions were increased to 1 - 200.

From November, 1926, to July, 1927, a total of 10,157 human sera were tested. Of this number 63, or about 0.6 per cent, showed practic-

ally a complete reaction in the four dilutions used and questionnaires were sent to the attending physicians in all but 1 case. Up to date answers have been received from 38 of these and second samples were run on 14. Only one of these showed no reaction by the agglutination test.

There were 21 males and 17 females in the 38 cases in which more or less complete data are at hand. Of the 17 women, one was in the hospital for parturition, 3 had previously suffered from two or more abortions, and 1 was diagnosed as having uterine ulceration. These 5 cases are significant if Belyea's work on the infection of the genitourinary tract is considered.

The questions on the source and amount of the milk ingested were answered sufficiently for analysis in 29 of the 38 questionnaires. Eighteen of the persons who exhibited a strong reaction to the agglutination test had partaken of raw milk. Of these, 7 ingested cow's milk only occasionally, 5 partook of it in large quantities and 6 were moderate users. Only 5 of the cases used pasteurized milk and in 6, the source of the milk was unknown.

Of the remaining 10,094 samples, 103 showed a partial reaction in three or more dilutions, 94 in the 1-25 and 1-50 dilutions and 157 in the first or 1 - 25 tube only. No questionnaires were sent on these sample numbers because it was believed that many of these might be non-specific reactors.

Although in 5 cases blood cultures were made, the results were negative. It was impossible to follow most of these patients very far since only a few of them were in the hospitals, and many had left the care of the attending physicians before receipt of questionnaires.

DISCUSSION

The experimental data presented here must be considered as merely a preliminary report. It was designed to gain some idea, if possible, of the prevalence in the general population of persons whose sera reacted in fairly high dilutions to the agglutination test with *Bact. abortus* antigen. The fact that these sera were not selected but were taken as a matter of routine by some hospitals and also from patients for suspected syphilis gives some added significance to the results obtained.

There has been up to the present, no agreement as to the dilutions which are significant in indicating the presence of living *Bact. abortus* organisms in the human body. The dilutions employed in this work were merely empirical, and it is doubtful from the results obtained if the 1 - 25 and 1 - 50 dilutions give more than non-specific reactions. This is borne out by the fact that no blood cultures were obtained even in those reacting through the 1 - 100.

There are several possible explanations for the presence of agglutinins for *Bact. abortus* in human sera. First, the patients might be harboring an active focus of infection with *Bact. abortus* and the antibodies would be constantly formed under the stimulation of the growing bacterial antigen. In these cases, it would be expected that reactions to the agglutination test would be in fairly high dilutions and consistent. The persons themselves would either exhibit symptoms of undulant fever or they might remain normal as so often happens in carrier states in typhoid. Second, agglutinins might be present in large quantities in cases recently recovered from an active infection with *Bact. abortus*, but these reacting bodies would gradually disappear and the subsequent test should become weaker. Third, agglutinins for *Bact. abortus* are present in large quantities in the milks of some cows and persons ingesting these milks in moderate amounts might react to the test owning to the passive absorption of these reacting bodies into the blood stream. This last reaction would be transitory unless the milk drinking was continued over a long period. The fact that no positive blood cultures were obtained does not necessarily indicate that persons of the first class were absent in this survey inasmuch as one negative blood culture does not preclude the presence of *Bact. abortus* in an individual.

The results indicate that only about 0.6 per cent of the sera tested show a complete reaction in the 1 - 100 dilution. Of these, only a relatively small number showed any symptoms which simulated those of Malta fever. Approximately 1 per cent gave a partial reaction through the 1 - 75 dilutions and 1.5 per cent in the 1 - 25 dilution which may or may not have been specific in this case. Therefore, provided that the agglutination test has any significance, the number of persons in the general population infected with *Bact. abortus* must be relatively small. Hull and Black (1927) found approximately 7.3 per cent of the 69 patients who consistently gave negative Widal reactions but had characteristic fever symptoms reacted to dilutions of 1 - 200 or better by the *Bact. abortus* agglutination test. These samples, however, were selected because of certain symptoms and do not give an idea of the prevalence of the disease in the general population.

It is significant that from 29 questionnaires in which data were given on the source of the milk supply, that 18, or about 62 per cent of the reacting persons, were users of raw milk and only 18 per cent had ingested pasteurized milk. The source of the milk in 20 per cent of the cases was unknown and it is very probable that at least 50 per cent of these used raw milk. This fact should give an added reason for pasteurization of milk from tuberculosis free herds, but with the present

state of our knowledge on the value of the agglutination test and the relatively small numbers of the individuals involved as indicated by these results, it does not seem wise to enforce compulsory pasteurization of the products from abortion infected farms.

SUMMARY

1. Ten thousand, one hundred fifty-seven samples of human sera which were submitted for the Wassermann examination were tested by the agglutination reaction using *Bact. abortus* as the antigen. Of this number, approximately 0.6 per cent gave reactions up through the 1 - 100 dilution. These results obtained in a state where preliminary testing has shown at least 90 per cent of the dairy herds to be infected with *Bact. abortus* and approximately 60 per cent of the milk only is pasteurized, indicates that infection of man with the bovine type of *Bact. abortus* is relatively rare, provided any significance can be attached to the agglutination test.

2. Attempts to follow the small number of cases reacting through the 1 - 100 dilution by the agglutination test were made through questionnaires, subsequent testing and blood cultures. This method was unsatisfactory on the whole inasmuch as many of the patients remained under the care of the attending physicians for only a short time.

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Measures Against Adenoids in Rome

AS a part of its campaign against adenoids, the government of the province of Rome established early in 1927 the first institute for the free treatment of adenoids. This institute is open to school children and young people. Soon after its establishment a special film on adenoids was prepared; it is loaned to private and public agencies. Later in the year circulars were sent out to the larger public child welfare agencies directing them to take measures for the treatment of adenoids among the children in their care. The National Bureau of Public Health is coöperating in this campaign by distributing literature on adenoids among the school teachers throughout Italy.—*Difesa Sociale*, Rome, Jan., 1928, p. 23.

H. Armstrong Roberts — ***The Joy of Childhood***

Courtesy Child Health Demonstration Committee

High School Girls Learning About the Care of Babies in Murfreesboro, Tenn.

Medical Center in New York Recently Opened

May Day—Child Health Day in Angleton, Tex.

Courtesy American Child Health Association

Seventh Grade Students in Athens, Ga., Learn About Diet by Experimenting with Rats.

Courtesy Child Health Demonstration Committee

The Age Distribution of Communicable Disease According to Size of Community*

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THE lack of adequate tabulations of morbidity statistics in the United States has been felt probably by every worker in the field of practical epidemiology. For the most part, our knowledge of the prevalence, by age and sex, of the common communicable diseases rests upon hospital statistics, the published reports of a few city health departments, and occasional articles in professional journals. The neglect fully to utilize available morbidity data is in striking contrast to the work expended on mortality statistics with resulting enormous annual waste of collected material.

Morbidity reports are looked upon usually as being merely for the purpose of notification in order that the proper authority may take suitable action to prevent the immediate extension of the disease. It is not generally appreciated that they have a further value as a guide in devising or revising methods of control, and that they furnish a useful ground work for the intensive study of particular material under special conditions.

For the past seven years the Division of Communicable Diseases of the New York State Department of Health has been engaged in tabulating by age and sex, the morbidity and mortality for typhoid fever, scarlet fever, measles, whooping cough, diphtheria and poliomyelitis for the years subsequent to 1914. The tabulations show the gross morbidity, by small groups of communities classified according to population, and so far as good data were available, the age and sex incidence for each group, and according to the month in which the case was reported to the department. The deaths have been similarly classified except that they are given for the month in which they occurred. Unfortunately we have no data as to the age and sex incidence of these dis-

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eases in New York City or for cities of 20,000 and over, prior to 1918. Even since 1917, the reports from the cities of 200,000 to 1,000,000 have been so incomplete as to age and sex that their tabulation by these items was discontinued. We are now receiving, however, tabulated reports from the city of Buffalo, and in time these will afford a useful basis for comparison. The grouping of the various communities of the state according to their population was suggested by the material differences in the death rates of the urban and rural areas for the diseases under consideration as shown by mortality statistics from various sources, examples of which are shown in Table I.

TABLE I

AVERAGE URBAN AND RURAL DEATH RATES 1911-1920
REGISTRATION AREA AND NEW YORK STATE

	Typhoid		Measles		Scarlet Fever		Pertussis		Diphtheria	
	U	R	U	R	U	R	U	R	U	R
Registration area*	11.6	15.8	9.7	8.6	6.0	3.8	9.6	11.4	19.3	13.0
New York State	7.2	8.0	10.4	5.0	5.9	2.9	8.1	7.0	20.9	7.8

* Mortality Statistics, 1920 "Urban" = cities in registration states; "rural" = rural part of registration states.

Climatic and racial conditions, no doubt, constitute an important factor in the variations shown by federal statistics. For example, the urban population of the registration area is predominantly northern, the rural, southern and western. Diphtheria and scarlet fever ordinarily show higher death rates in the north than in the south and typhoid fever lower. Hence diphtheria and scarlet fever might easily be classified as an "urban" and typhoid as a "rural" disease without there really being anything more than climate as a causative factor. For the statistics of New York State, however, climatic differences are of little importance, and since in the main they correspond with the federal statistics so far as the diseases in Table I are concerned, it is to be inferred that there are essential differences between urban and rural communities which bring about this result. However, it was known, for example, that the favorable urban typhoid rates for New York State were due to the influence of the low New York City rates for this disease; that this New York City rate concealed an actually higher urban than rural rate in the remainder of the state. It seemed not unlikely therefore that within the broad classifications of "urban" and "rural" there also might be concealed conditions tending to high rates from communicable diseases whose recognition might enable us to concentrate our attack with better results for the effort expended.

Furthermore, the morbidity statistics formerly published by the Pennsylvania State Department of Health showed rather constant differences in the age distribution of urban and rural cases of scarlet fever and diphtheria, and it seemed desirable to ascertain whether these

TABLE II

COMPOSITION AND CHARACTERISTICS OF POPULATION, NEW YORK STATE EXCLUSIVE OF NEW YORK CITY

BY PLACES GROUPED ACCORDING TO POPULATION

Size of Community	No. of places in group	Total	Age Distribution				
			Under 5	5-9	10-14	15-19	20 & over
State (exc. N. Y. C.)	1,456	4,818,348	454,370	440,397	411,969	367,640	3,143,972
200,000-1,000,000	2	783,666	79,470	72,574	63,478	59,972	508,172
50,-200,000	8	720,529	68,234	63,703	58,291	53,701	476,600
20,-50,000	17	513,005	46,785	45,356	42,527	40,130	338,207
10,-20,000	31	390,951	37,806	35,112	32,643	30,035	255,355
5,-10,000	32	235,917	23,098	22,084	20,192	18,549	151,994
2,500-5,000	83	288,955	26,092	25,836	25,193	21,911	189,923
Under 2,500, Inc.	354	360,038	172,885	175,732	169,645	143,342	1,223,721
Unincorporated towns	929	1,525,287					

	Age Distribution					Other Characteristics of Population						
	Und. 5	5-9	10-14	15-19	20 & over	Percent of Native White of Native Parents	Percent of Females 20-44 Foreign Born	Illiterate 10 & over	Illiterate 21 & over	Families per dwelling	Persons per dwelling	Persons per family
State (exc. N. Y. C.)	9.4	9.1	8.6	7.6	65.3	52.6	20.6	3.7	4.5	1.2	4.97	4.10
200,000-1,000,000	10.1	9.3	8.1	7.7	64.8	34.5	27.1	4.3	5.5	1.4	6.16	4.35
50,-200,000	9.5	8.8	8.1	7.5	66.1	42.6	25.0	4.4	5.7	1.5	6.56	4.24
20,-50,000	9.1	8.9	8.3	7.8	65.9	46.0	23.1	4.2	5.1	1.3	5.55	4.16
10,-20,000	9.7	9.0	8.3	7.7	65.3	52.1	19.6	4.1	5.0	1.2	5.05	4.14
5,-10,000	9.8	9.4	8.5	7.9	64.4	51.9	20.7	4.3	5.3	1.2	5.06	4.22
2,500-5,000	9.0	9.0	8.7	7.6	65.7	56.9	18.1	3.5	4.0	1.1	4.42	3.93
Under 2,500 Inc. Unincorporated towns	9.2	9.3	9.0	7.6	64.9	66.1	14.5	2.9	3.2	1.0	4.12	3.93

variations held true for New York State for these diseases and also for measles, whooping cough and poliomyelitis, and whether these variations showed any constancy as the size of the community varied. Accordingly, the communities of the state were classified into 8 groups for the quinquenium 1915-1919 according to their estimated population as of July 1, 1917. The estimates for each group for each year were based on the United States census of 1910 and the state census of 1915. For the quinquenium, 1920-1924, the communities were grouped according to the estimated population of 1920 based on the state census of 1915 and the federal census of 1920.

Each of the groups is held constant for the quinquenium except as a village or city may be incorporated from previously unincorporated territory. In this event the population of the city or village is added to that of the group to which it belongs according to the enumerated or estimated population at the time of incorporation as shown by the return made to the secretary of state, and the same figure is subtracted from the population of the town group. We have preferred to keep the

groups thus constant throughout the quinquenium rather than shift the individual communities about from year to year as their estimated populations might rise above or fall below the limits of the group to which they were originally assigned. The principal reason for this was to avoid accidental fluctuations in rates due to epidemics. The division points are arbitrary in any event and there is no essential difference between a place of 2,400 and one of 2,600 or one of 9,000 and one of 11,000.

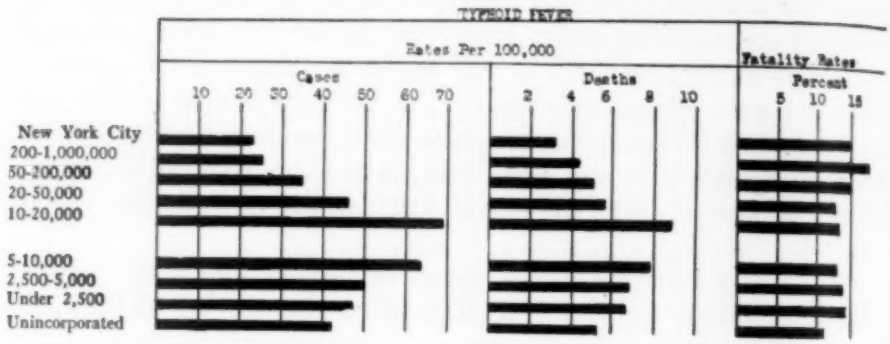
On the other hand the cyclical return of measles, for example, might strike a community the year of its transfer, or the year before its transfer to another group. In the former case there would be a purely artificial increase in the rate of the group to which the community was transferred while in the latter there would probably be factitious decrease because of the addition of a population with little likelihood of another outbreak for a number of years. Although it may be that the groups are too numerous, in that the populations of certain of them are too small and that essential differences between successive groups are not easily discernible, yet two or more groups may easily be combined by any one wishing a broader classification, as we do ourselves in common practice.

We have estimated also the populations for each 5-year age period under 20 and for the period 20 and over, for each of the population groups, and have calculated sundry items such as the percentage of foreign born women age 20 to 24, the number of families per dwelling, persons per dwelling and the percentage of illiterates. Unfortunately the federal census furnishes no figures which enable one to distinguish between incorporated places of less than 2,500 and unincorporated territory. There are other deficiencies in the figures on the characteristics of the population of places of less than 10,000 but this deficiency in the statistics of places of less than 2,500 population I regard as the most unfortunate. As will be seen from the subsequent tables there is a striking difference in the morbidity and mortality figures between incorporated places of less than 2,500 and the unincorporated towns. To what extent they are due to differences in the population makeup, we have no means of telling.

TYPHOID FEVER

The first of our tables to be considered is for typhoid fever, representing 33,597 cases and 4,653 deaths. The 10-year average of the case, death and fatality rates by each of the population groups is shown in Figure I. Both cases and deaths have been allocated to the place where infection occurred so far as this could be determined with reason-

FIGURE I



Case, death and fatality rates for typhoid fever according to size of community (density of population)
Average for New York State 1915-1924

able certainty. This shows quite distinctly that typhoid fever is neither a rural, nor a large city, nor yet a small village disease in New York. The highest case and death rates are in the cities of from 10,000 to 20,000. Both morbidity and mortality regularly increase through the successive groups to this group and then decline. The inferences we draw from the table are that rural conditions in New York are not very favorable to the transmission of typhoid fever; that flies play a minor rôle, that the infection of private wells is not very common; and that contact cannot be a major factor else the rate would continue to increase as dispersion decreased.

The high rates in places of from 5,000 to 20,000 indicate inadequate safeguards over the water and milk supplies. A well that may supply without mishap a community of 5,000, begins to drain pollution when twice as much water is pumped from it or an auxiliary supply of doubtful purity is resorted to from time to time as the regular supply fails. The need for a better quality of supervision than suffices for the small village is not recognized. This failing is even more likely to be true of the milk supply. The personnel of the health department is not expanded to keep pace with the increasing number of dairies, and pasteurization of the milk supply encounters greater difficulties than in larger places.

Personally, I believe that a very large part of this small city typhoid is transmitted through milk and water and remains unrecognized as such because the cases occur sporadically or in very small outbreaks, the primary epidemiological data are not collected with sufficient thoroughness, and the histories of cases of prior years are not reviewed with those of the current cases.

TABLE III

PERCENTAGE OF TOTAL CASES AND DEATHS AND FATALITY RATE AT EACH AGE PERIOD
ALL PLACES UNDER 200,000 POPULATION, 1915–1924

Typhoid Fever

Age	Per cent of all ages		Fatality Rate
	Cases	Deaths	Per cent
Under 5 years	4.5	3.1	8.4
5–9	13.8	5.0	4.4
10–14	14.3	7.5	6.4
15–19	14.2	11.8	10.2
20–24	12.0	12.2	12.5
25–29	9.7	10.7	13.5
30–34	7.7	10.3	16.4
35–39	6.3	7.9	15.2
40–44	5.4	6.6	15.2
45–49	3.9	6.3	19.9
50–54	3.3	6.1	22.9
55–59	2.0	3.7	22.8
60 and over	2.9	8.7	36.5

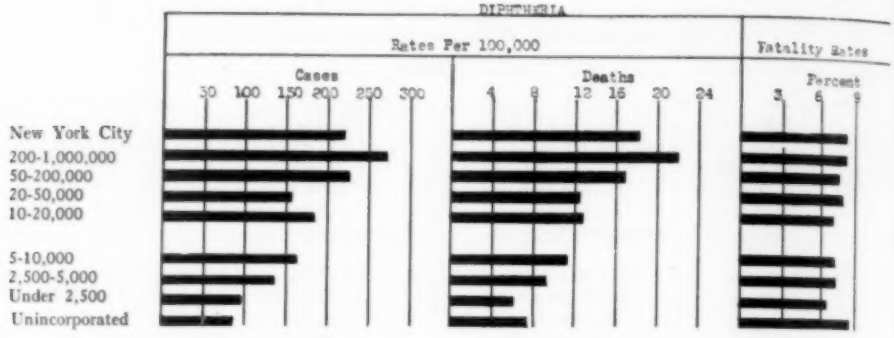
Despite the low rates in the unincorporated towns and the small villages, it is a common custom of the larger places to charge their summer and autumnal typhoid increase to vacations in the rural districts. Failure to study local cases honestly has led to at least one disastrous outbreak in recent years.

The average distribution of cases and deaths and the fatality rates by age of typhoid are shown in Table III, representing 16,607 cases and 2,034 deaths. The largest number of cases was in the age period 10 to 14 years with the period 15 to 19 years almost as large. Of all the cases, 28.5 per cent fall in the period covering the second decade of life. The largest number of deaths occur from 20 to 24 years, the 15- to 19-year period again being a close second. There is little difference in the proportion of cases by ages between the smaller and larger communities except that a much larger percentage of the cases and deaths occur at 60 and over in the places under 10,000, than in places of greater size. The lowest fatality rate is at age 5 to 9, when it is about one-third of the rate at all ages. The fatality rate at all ages over 45 is very high, but only a little over 12 per cent of the cases occur after that age.

DIPHTHERIA

The case, death and fatality rates for diphtheria by size of place are shown in Figure II, representing 200,111 cases and 16,030 deaths. It will be observed that there is a fairly uniform decline in both the case and death rates as we go from the largest cities to the smallest villages and that although the morbidity rate is less in the towns than else-

FIGURE II



Case, death and fatality rates for diphtheria according to size of community (density of population) Average for New York State 1915-1924

where, the mortality is higher than in the small village group. The fatality rate is highest in the towns, next highest in the largest cities, and is lowest in the small villages.

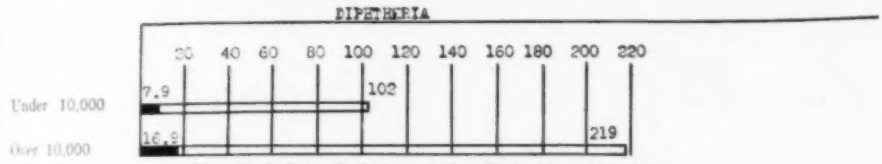
Two exceptions to these general statements are to be noted: First, the case and death rates for New York City are smaller than the corresponding rates for places from 200,000 to 1,000,000; and, second, the rates for places of 20,000 to 50,000 are smaller than the rates for those of 10,000 to 20,000. As to the first, an examination of the annual figures show that for the first 5 years of the decennium, the rates were almost identical and that the New York City rate fell very rapidly after 1919.

The rate in the group of 200,000 to 1,000,000 also began a very rapid decline after 1920 but this was largely a recession from a period of very high rates due to an extensive and very fatal outbreak in Buffalo. The New York City decline therefore seems more significant of improvement in control. In 1921 the rate for that city was lower than for the rest of the state for the first and only time in its history, following two years of extensive toxin-antitoxin work that had been done in the public schools by the late Dr. Zingher. It seems possible that although this school immunization did not reach the heart of the problem, it made possible an unprecedented reduction from the rates of former years.

We are unable to account for the unusually low rate in places of 20,000 to 50,000. This same discrepancy appears also in the case rates from scarlet fever and the death rates from scarlet fever and measles. We have sought rather diligently for a plausible reason, but apparently it is not to be found in the population makeup, nor can it be

accounted for by notable work in immunization, since much the same irregularity existed for the 5-year period 1915-1919 before any large scale toxin-antitoxin work was begun. The outstanding fact, as shown by these figures, is that diphtheria is a disease of cities both in prevalence and mortality—a fact more clearly shown when we compare the case and death rates of places over, and places under 10,000 (Figure III).

FIGURE III



New York State Exclusive of New York City 1915-1924
Case and Death Rates per 100,000 population

The lower case rate and the higher death rate in the unincorporated territory has been noted. This is a feature which is also common to scarlet fever, measles and whooping cough, but not as we have already seen to typhoid fever, nor as we shall see later to poliomyelitis. We have interpreted this as being due partly to poor reporting in the unincorporated districts and partly to less adequate medical and nursing care. We have not attempted to assess the relative weights of these two factors as it is obviously difficult to obtain the data necessary to form a judgment. It is not unreasonable to believe, however, that considering the distances to be covered, the greater expense and the difficulties of winter travel in New York State, the administration of antitoxin is frequently delayed in rural districts either because the physician is not called until the case is regarded as serious or because an extra trip has to be made if the physician is not given a hint as to the possibility of diphtheria before making his first visit. The likelihood of death from respiratory obstruction before medical aid can reach the patient is also increased.

The age distribution of diphtheria cases and deaths and the fatality rates by age are shown in Table IV, representing 50,256 cases and 3,715 deaths. It will be seen that a little less than a quarter of all the cases and a little more than half of the deaths occur in the first 5 years of life; that a little more than a third of the cases and rather less than a third of the deaths occur in the age period 5 to 9. The table shows that 57 per cent of the cases and 82 per cent of the deaths occur in children under 10 years of age. The importance of this in planning a toxin-antitoxin campaign is quite apparent. Where the resources are limited and the difficulties at best are very great, it is extremely important

TABLE IV

PER CENT OF TOTAL CASES AND DEATHS AND FATALITY RATE AT EACH AGE, ALL PLACES UNDER 200,000 POPULATION, 1915-24

Diphtheria

Age	Per cent of all ages		Fatality Rate
	Cases	Deaths	Per cent
Under 1 year	1.3	4.7	26.9
1	2.8	10.6	28.1
2	4.8	12.2	18.6
3	6.4	12.2	14.1
4	6.8	11.8	12.8
5	7.4	9.9	9.9
6	8.1	7.7	7.0
7	7.5	5.8	5.7
8	6.5	4.1	4.6
9	5.3	3.4	4.8
Under 5 years	22.2	51.5	17.2
5–9	34.8	30.9	6.6
10–14	17.8	8.2	3.4
15–19	7.0	2.4	2.5
20 and over	18.3	6.9	2.9

that the efforts be expended where they will produce the greatest corresponding benefit. The failure to reach the preschool age group means that less than half of the mortality can be prevented at the most, and that campaigns limited to school children will not suffice to reduce the death rate permanently to a very marked degree.

In Table V are shown the percentages of cases and deaths under 5 years of age according to the size of the community. This is interesting in that it shows the much higher proportion both of cases and deaths at this age in the large communities as compared with the small ones, a feature common to this class of diseases. It will be noted that in the group of 20,000 to 50,000 population the percentage of deaths is very much smaller than in the three succeeding groups. A somewhat surpris-

TABLE V

PER CENT OF TOTAL CASES AND DEATHS AND FATALITY RATE UNDER 5 YEARS OF AGE, ALL PLACES UNDER 200,000 POPULATION, 1915–1924

Diphtheria

Population Group	Rates per 100,000		Fatality Rate
	Cases	Deaths	Per cent
Total	22.2	51.5	17.2
50-200,000	28.4	59.6	14.7
20-50,000	21.5	46.9	16.0
10-20,000	23.2	56.0	16.8
5-10,000	21.4	59.9	19.8
2,500–5,000	19.8	50.5	18.1
Under 2,500	13.9	37.0	16.7
Unincorporated	19.1	46.2	20.5

ing figure is the large percentage of cases and deaths under 5 years of age in the unincorporated territory, much larger it will be noted than in the group of smallest villages. The fatality rates at this age are shown in column 3 and call attention to the very high rate which still prevails despite the almost universal use of antitoxin.

Since it is quite obvious that the age distribution of the population may be responsible for certain of the variations in the incidence at different age periods, Table VI shows the specific case and death rates

TABLE VI

AVERAGE CASE AND DEATH RATES PER 100,000 POPULATION AT EACH AGE PERIOD 1915-24

Diphtheria

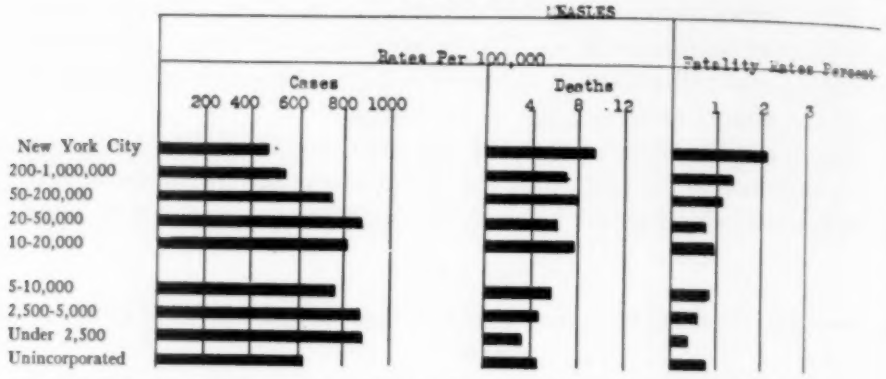
Population Group	Under 5		5–9		10–14		15–19		20 & over	
	C	D	C	D	C	D	C	D	C	D
50,-200,000	522	77	738	38	324	10.3	112	2.0	36.8	0.8
20,-50,000	266	46	512	37	275	8.2	105	2.7	28.4	0.8
10,-20,000	425	71	716	43	386	7.0	142	2.3	43.9	1.0
5,-10,000	349	69	608	29	355	11.4	139	3.8	42.1	0.8
2,500-5,000	300	54	514	37	296	6.7	140	3.6	41.6	0.9
All others	176	35	300	24	187	8.5	105	3.1	31.8	1.2

by 5-year age groups under 20 years. It is unfortunate that we are unable to give separate rates for the small villages and the unincorporated territory as it may be that there are important differences. It will be noted that the recession in case and death rates in the cities of 20,000 to 50,000 previously mentioned holds in the specific as well as in the crude rates. It will be seen too that the decline in the case and death rates from those of large places to those of small is most marked in the lower age periods.

MEASLES

The distribution of measles cases and deaths and the fatality rates by size of the community are shown in Figure IV, representing 594,159 cases and 8,176 deaths. For places other than New York City the deaths occurring in institutions for children have been excluded. The high fatality rates which formerly at least prevailed in these institutions produced an undesirable distortion of the mortality and fatality rates; in other words, the fatality and mortality rate of a group would depend in a considerable degree upon whether or not there were located in the communities constituting that group a number of institutions caring for small children. The unequal distribution of such institution deaths is shown by the fact that in the places of 200,000 to 1,000,000, only 5 of the 557 deaths in the 10-year period were in such institutions, whereas in places of 50,000 to 200,000, 85 out of 654 deaths occurred

FIGURE IV



Case, death and fatality rates for measles according to size of community (density of population)
Average for New York State 1915-1924

in such institutions. In the one case the mortality rate per 100,000 population was raised by only 0.1 and in the latter by 1.2.

The noticeable feature of the case rate is that measles was apparently equally as prevalent in the smallest villages as in the cities, although the mortality rate shows much the same tendency to decline that we found in diphtheria.

Attention is called to the extremely low fatality rate for the small villages where out of 31,214 cases there were but 120 deaths in the 10-year period.

The per cent of cases and deaths and the fatality rates by age are shown in Table VII, representing 268,250 cases and 1,940 deaths. It will be observed that although only 13.2 per cent of the cases occurred in children under 3 years of age, that 66.4 per cent of all of the deaths occurred at those ages. Seventy-five and one-half per cent of the deaths occurred under 5 years of age, and although nearly 50 per cent of the cases occurred from the 5th to the 14th year these age periods were responsible for only 12 per cent of the deaths. The highest fatality rate was in children under 1 year of age but the greatest number of deaths occurred at age 1 year. The fatality rate drops very rapidly during the first few years of life and the disease is apparently least fatal between the 5th and the 15th year.

There is some question, of course, as to the relative completeness of reporting at the different ages, as it might be that a child of school age would have a better chance of being reported than the preschool child or the adult. We have endeavored to answer this question from the data secured during the intensive investigations of a few community epidemics, and find that although in an epidemic in a small village the

TABLE VII

PER CENT OF TOTAL CASES AND DEATHS AND FATALITY RATE AT EACH AGE, ALL PLACES UNDER 200,000 POPULATION, 1915–1924

Measles

Age	Per cent of all ages		Fatality Rate Per cent
	Cases	Deaths	
Under 1 year	2.2	24.6	7.93
1	4.8	30.8	4.63
2	6.2	11.0	1.29
3	7.0	5.7	0.59
4	7.7	3.4	0.32
5	9.1	2.5	0.20
6	11.1	2.3	0.15
7	10.0	1.9	0.14
8	8.1	1.2	0.11
9	5.6	1.3	0.16
Under 5 years	27.9	75.5	1.96
5–9	43.9	9.2	0.15
10–14	14.8	2.8	0.14
15–19	6.2	2.6	0.30
20 and over	7.2	9.9	1.00

reporting was actually better in children under 5, the reverse has been true in each of the larger places. In a city of 20,000 the ratio of completeness of reporting was about 9 to 10 and in two cities of over 100,000 the ratio was about 7½ to 10. These investigations have also shown that the ratio of reporting was much less complete in the larger places than in the smaller ones, accounting in part for the relatively lower case rates and higher fatality rates in the former.

TABLE VIII

AVERAGE CASE AND DEATH RATES PER 100,000 POPULATION AT EACH AGE PERIOD 1915-24

Measles

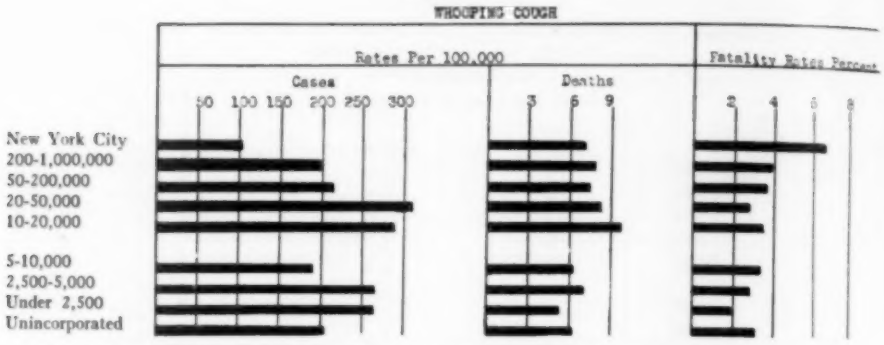
Population Group	Under 5		5–9		10–14		15–19		20 & over	
	C	D	C	D	C	D	C	D	C	D
50,–200,000	2087	52	3055	3.4	389	0.7	143	0.0	28.4	0.1
20,–50,000	2304	37	3587	3.3	679	0.5	187	0.7	35.5	0.4
10,–20,000	2800	59	4254	6.3	720	0.9	261	0.3	49.2	0.4
5,–10,000	2267	45	4060	11.3	920	2.0	306	0.5	55.3	0.3
2,500–5,000	2742	41	4710	8.5	1303	0.8	455	1.6	69.2	0.5
All others	1551	29	2615	4.1	1507	2.3	887	2.9	110.0	1.2

Table VIII shows the specific rates by age. The high mortality in children under 5 years old and the comparatively low death rate at this age in places of from 20,000 to 50,000 are noteworthy. The low case and death rates under 5 years and the higher case and death rates in the age groups over 10 in places of less than 2,500 indicate cause and effect in herd susceptibility.

WHOOPING COUGH

Figure V shows the distribution of whooping cough cases and deaths and the fatality rates by size of the community, representing 168,315 cases and 7,353 deaths. It will be noted that although the case rate is

FIGURE V



Case, death and fatality rates for whooping cough according to size of community (density of population) Average for New York State 1915-1924

more than twice as high in the state outside of New York City as in the city itself, the death rates are practically identical. Less complete reporting undoubtedly accounts for the bulk of this discrepancy.

There seems to be no regular relationship between either the morbidity or mortality rates and the size of the community. I would point out, however, that although whooping cough is frequently spoken of as a rural disease and the death rates for the registration area show a higher mortality in the urban than in the rural districts, in New York State the highest morbidity and highest mortality are found in the two groups comprised of places having populations of from 10,000 to 50,000. The fatality rates are highest in the larger cities, lowest in

TABLE IX

PER CENT OF TOTAL CASES AND DEATHS AND FATALITY RATE AT EACH AGE, ALL PLACES UNDER 200,000 POPULATION, 1915–1924

Whooping Cough

	Per cent of all ages		Fatality Rate
Age	Cases	Deaths	Percent
Under 1 year	7.9	56.9	20.07
1	8.1	23.1	7.96
2	9.7	7.9	2.29
3	10.6	3.6	0.95
4	10.5	2.5	0.66
5	11.0	1.4	0.36
6	10.9	1.0	0.26
7	8.7	0.9	0.28
8	6.5	0.5	0.23
9	4.1	0.2	0.14
Under 5 years	46.8	94.1	5.62
5–9	41.2	4.0	0.27
10–14	8.5	0.6	0.20
15–19	1.4	0.3	0.58
20 and over	2.1	1.0	1.33

the small villages and apparently depend for the most part on the relative completeness of reporting.

The age distribution of the cases and deaths and the fatality rates by age are shown in Table IX and serves to emphasize the large proportion of deaths which occur in the early years of life, especially during the first year of life. Nearly 95 per cent of all the deaths occur at this time. It also shows that unlike measles the greatest morbidity is during this age period.

TABLE X

AVERAGE CASE AND DEATH RATES PER 100,000 POPULATION AT EACH AGE PERIOD, 1915-24

Whooping Cough

Population Group	Under 5		5–9		10–14		15–19		20 & over	
	C	D	C	D	C	D	C	D	C	D
50-200,000	945	51	777	1.4	90	0.2	10	0.0	4.6	0.04
20,-50,000	1298	51	1075	2.2	123	0.0	15	0.0	5.1	0.00
10,-20,000	1543	90	1190	3.1	132	0.3	21	0.0	6.3	0.04
5,-10,000	948	59	862	4.1	121	0.0	17	0.0	3.3	0.13
2,500-5,000	1448	72	1277	2.7	179	1.6	28	0.0	7.7	0.11
All others	964	61	952	3.0	310	0.5	65	0.5	8.6	0.14

The specific case and death rates by age are given in Table X. With the exception of two groups the death rate under 5 is higher than for any other of the so-called children's diseases and the death rates at this age are higher in each of the groups under 10,000 population than in either of the two groups of over 20,000. This is a remarkable thing in a disease of the respiratory tract presumably transmitted by immediate contact. It is important because it seems to support the hypothesis that poliomyelitis is ordinarily transmitted in much the same way.

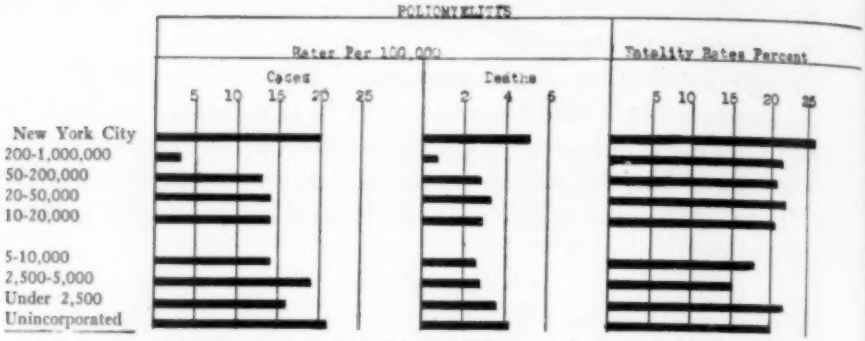
Whooping cough ranks next to diphtheria in New York as a cause of death from the acute communicable diseases of childhood and its death rate has declined less than that of any of the others during the past twenty years. It is the least completely reported and is perhaps the most difficult to control of our epidemic diseases.

POLIOMYELITIS

The case and death rates and the fatality rates for poliomyelitis by size of community are shown in Figure VI, representing 18,299 cases and 4,337 deaths. The relatively high case and death rates in New York City are due entirely to the great epidemic of 1916. Since then the highest case rate in New York City has been 10 per 100,000 and the highest death rate 2.5 per 100,000. Most of the other groups shared in the high rates of 1916 but the places of 200,000 to 1,000,000 were an exception. It is a curious fact that the city of Rochester has never suffered a large epidemic of poliomyelitis.

The remarkable feature in the distribution of poliomyelitis by size

FIGURE VI



Case, death and fatality rates for poliomyelitis according to size of community (density of population) Average for New York State 1915-1924

of community is the high case and death rate which prevailed in places of less than 5,000 population. I wish to point out also that the case rate, as well as the death rate, was higher in the unincorporated towns than in the groups of denser population, and the fatality rate was lower than in the villages of less than 2,500. It seems to me that this distribution is very difficult to explain on the hypothesis that poliomyelitis is spread for the most part by contact and through the secretions of the nose and throat. None of the other diseases supposed to be so transmitted shows a higher crude case rate in places where the dispersion of population is greatest and the mortality and fatality rates seem to confute the argument that it is due to vagaries of reporting.

TABLE XI

PERCENTAGE OF TOTAL CASES AND DEATHS AND FATALITY RATE AT EACH AGE, ALL PLACES UNDER 200,000 POPULATION, 1920–1924

Poliomyelitis

Age	Per cent of all ages		Fatality Rate
	Cases	Deaths	Per cent
Under 1 year	4.3	6.8	26.1
1	10.1	10.8	17.4
2	10.8	6.5	9.8
3	9.0	5.7	10.3
4	8.3	6.8	13.4
5	5.8	4.5	12.8
6	6.2	4.0	10.4
7	4.8	5.1	17.3
8	3.8	3.4	14.5
9	3.6	2.6	11.7
Under 5 years	42.5	36.6	14.0
5–9	24.2	19.6	13.2
10–14	15.0	17.3	18.9
15–19	8.7	7.7	14.4
20 and over	9.6	18.8	31.7

The distribution of cases by age, shown in Table XI, shows that less than half of the cases and deaths occurred in children under 5. It also shows that nearly 10 per cent of the cases and almost 20 per cent of the deaths occur in adults. The percentage of cases for each age group by size of community shows the usual greater incidence among the young in the larger places and the relatively large distribution among adults in the small villages and unincorporated towns. The number of cases comprised in some of the groups as shown is quite small, however, and one's interpretation must be cautious.

TABLE XII

AVERAGE RATES PER 100,000 POPULATION AT EACH AGE, 1920-24
(BASED ON 1922 POPULATION ESTIMATES)

Poliomyelitis

Population Group	Under 5		5–9		10–14		15–19		20 & over	
	C	D	C	D	C	D	C	D	C	D
50,–200,000	63	5.2	27	3.0	12	3.5	7	2.8	1.0	0.3
20,–50,000	54	9.2	22	2.1	10	2.7	8	1.9	1.3	0.3
10,–20,000	44	7.4	26	4.3	18	2.9	14	1.2	1.5	0.6
5,–10,000	32	4.8	14	4.0	10	2.2	5	0.0	0.6	0.0
2,500–5,000	46	6.7	25	2.3	15	3.1	10	0.9	0.9	0.1
All others	43	6.8	32	4.4	23	3.8	16	1.7	2.1	0.7

Table XII shows the specific case and death rates by 5-year age groups. The comparatively high case and death rates in places over 10,000 as compared with smaller places of ages under 5 is in contrast with the crude case and death rates. The comparatively low case and death rates at all ages in places of 2,500 to 10,000 and the high case and death rates, especially the former, in places under 2,500, are perhaps worthy of remark.

In the foregoing I have selected certain features shown by the tables and touched briefly upon my interpretation of them. But whether the selection is good or the interpretation is correct is of less importance than bringing these tables and the more extended ones upon which they are based* to the notice of others better able to deal with them from a technical standpoint. We know that they have an immediate value in administrative practice and they have suggested hypotheses we hope to test by further investigations. I feel quite sure that there are implications which have altogether escaped me but which will be discovered by other more discerning workers. It is not too much to hope, I trust, that good use will be made of these figures, that other lines of investigation will be suggested, that our knowledge of communicable diseases will be to some extent deepened and administrative procedure placed on a sounder basis.

* *Annual Report*, New York State Dept. of Health, Vol. 1, pp. 130, 1925.

EDITORIAL SECTION

Expressions of opinion and statements of supposed facts are published on authority of the writer under whose name they appear, and are not to be regarded as expressing the views of the American Public Health Association, unless such statements or opinions have been adopted by vote of the Association.

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THE PREVALENCE OF THE VENEREAL DISEASES

HOW much syphilis and gonorrhea is there in the United States? Accurate data on the prevalence of the venereal diseases are lacking. Old figures are still being quoted, such as those obtained from the draft examination, special group reports, such as army, navy or hospital figures, and case reports made to state health departments and collected by the U. S. Public Health Service. It has been impracticable so far to obtain accurate information for a general population group. Such information is essential to an intelligent understanding of the many problems connected with the control of the venereal diseases. Therefore, an effort has recently been initiated to take soundings in various parts of the country—that is, to select cities typical of various conditions and make every possible effort to obtain a count of "known" cases of syphilis and gonococcal infection.

To answer, then, the question, "How much syphilis and gonorrhea is there in the United States?" incidence studies have been made by the American Social Hygiene Association in coöperation with the U. S. Public Health Service in a number of places including Detroit, Atlanta, Cleveland, New Haven and other cities and counties. The desired information was secured through personal interviews of doctors and other persons "licensed to practice the healing art." Each one was asked how many cases he had under treatment or observation on a given date. The accuracy and completeness of the data was entirely dependent upon the physicians' good faith and willingness to coöperate in the undertaking. Interest was shown to a surprising degree, and there has been a general request for final tabulated results. In Detroit only 8 out of 1747 practitioners refused information.

Of the 1,739 physicians who did reply in the Detroit study 49 per cent reported one or more cases of venereal diseases. Of the 66 clinics and hospitals reporting, 35 per cent had cases under treatment. In

all, 16,735 cases of syphilis and gonorrhea were said to be under observation or treatment on the day selected, a rate of 13.47 cases per 1,000 total population of the city. Males over 16 years of age showed a rate of 24.29 per 1,000 of the corresponding group of the population. Of the total cases reported, 8,665 were syphilis, a rate of 6.98 cases per 1,000 population, and 8,070 were gonorrhea, or 6.50 per 1,000. Of the total number enumerated, syphilis cases were slightly more numerous than gonorrhea cases, but in the male group 16 years and over, gonorrhea cases slightly predominated. Seventy per cent of the total number were being treated in private practice. About 96 per cent of the total number of cases were among persons 16 years of age or over, but among males about 97 per cent of the cases and among females 91 per cent were of this age group. Relatively more cases seem to occur at the younger ages among females. Of the total number of syphilis cases, 37 per cent were females, and of the total gonorrhea cases 22 per cent. But among persons under 16 years of age 52 per cent of syphilis cases and 72 per cent of the gonorrhea cases were among females. It appears that both of these diseases are relatively more frequent among young females than among young males.

The question arises as to what is the relation of the number of cases under treatment or observation on one day to the total number seen in a year. Accordingly many doctors were questioned as to the annual turnover of patients in their offices. Estimates varied between 5 and 20. Many patients "shop around" between different doctors and clinics during the course of a year so that if a year's cases were counted there would be considerable duplication of individuals. The clinic probably makes a greater effort than the private physician to keep its patients continually coming for treatment until cured. So taking everything into consideration, it might be assumed that the patients enumerated in the one day census were about one-fifth of the total number seen in a year.

The information collected by the Detroit survey and other similar studies cannot possibly give an accurate measure of the actual prevalence of venereal diseases. Even if cases known to medical practitioners can be counted accurately, there is no way, from the information now available, in which the number of cases can be estimated which are not under treatment, either on account of ignorance or indifference of those affected, or because they are undergoing self-treatment. The count in the Detroit survey, however, revealed an unexpected number of cases actually under treatment. How many more there must be it is impossible to say. The army figures showed a ratio of one syphilis case to every four of gonorrhea. The Detroit study showed gonococcal

infections, among males over 16 years of age at least, only slightly outnumbering syphilis cases. Does this mean that there is less gonorrhea among adult men than was found at the time of the army draft examination ten years ago, or is self-treatment or no treatment at all a common state of affairs, so that a large number of existing cases were not counted in the Detroit study? These and other questions of a similar nature are important to the public health administrator today.

Another important fact brought out by the survey was that 70 per cent of all the cases enumerated were under treatment by private practitioners. About half the physicians visited had cases under treatment. Thus it would seem that the physician, rather than the public clinic, very largely holds in his hands the problem of the control, and therefore the prevention, of the venereal diseases.

These studies will be continued, and it is hoped that by the end of 1928 enough data will be in hand to provide a base line from which to measure future trends in venereal disease incidence.

NOTE: Copies of the report *A Survey of the Venereal Disease Prevalence in Detroit*, can be had upon application to the American Social Hygiene Association, 370 Seventh Avenue, New York, N. Y.

THE FOOD VALUE OF MILK

WE believe that there is no question in the minds of American physicians concerning the necessity of milk as a food, especially for growing children, though its value for adults is also recognized. The general knowledge of the food value of milk was recognized long before the discovery of vitamins. This discovery, however, added exactness to our observations and strength to the argument in favor of milk.

Recent publications of a preliminary report [1-2] made under the auspices of the Scottish Board of Health have confirmed the previously held ideas and carried them somewhat further. Groups of children of the ages of 5 to 6, 8 to 9, and 13 to 14 years in seven Scottish towns were selected, four groups for each town, each of which contained from 40 to 50 children. The first group was given the ordinary diet; for the second the diet was supplemented by biscuit, the third by separated milk, and the fourth by whole milk. The feeding was carefully superintended at the schools, in addition to which, the home dietary in 626 cases was studied, since some children received milk there in addition to that given at the schools, and the latter was regarded as an accessory article of diet. The experiment continued over seven months, and showed an average monthly increase of 0.17 inches and 0.42 pounds for the groups which did not receive extra milk, against 0.21 inches and 0.52 pounds for those receiving milk. The average increase in height was 1.470 inches, and in weight 3.617 pounds, for the milk-taking

group, against 1.212 inches and 2.974 pounds for those not receiving it. These figures include the three age groups mentioned. For the age group 5 to 6, the percentage of increase in height of those taking over the average amount of milk was 9.4, for the age group 8 to 9, 15.5, and for the 13 to 14 group, 24.2.

The general condition of the children was noted, and on the whole it was found that the hair was glossier, the complexion clearer, and they held themselves more erect. There were some exceptions to this general rule, and the most marked improvement occurred in those groups in which the condition of the children was poorer to begin with. The general condition, however, has led Dr. Orr, who is Chairman of the Research Committee, to draw conclusions which he calls provisional, though there it little doubt that further experiments which are under way will confirm them. These may be summed up as follows:

The children who received an addition of milk to their diet showed a rate of growth as indicated in both height and weight, 20 per cent greater than those not receiving the extra milk, accompanied by an improvement in their general condition. Of particular interest are the groups which were fed on separated milk, which has been discredited in this country as well as in England to a great extent. Dr. Orr concludes that it is of great value for promoting growth and that its nutritive value seems to have been much underestimated. The *British Medical Journal* makes the interesting comment, in comparing the children fed on biscuit with those taking extra milk, that the aggressive and dominant races have usually been those which consumed milk, while the docile and subject ones have used grain as their principal diet.

While accepting these conclusions, concerning the accuracy of which we have no doubt, we wish to point out that there is no food of equal value which is generally so badly handled as milk, or which has been subject to so great manipulation. In most countries, especially the United States and England, there are numerous regulations concerning the quality and handling of milk and milk products, and one need only consult the records to see how often these regulations are violated.

Milk varies with the season and with the feeding of the cow, especially in regard to its vitamin content. Campaigns to increase the drinking of milk and the use of butter are excellent in their way, but the public deserves to have the information that there is a great difference between the milk derived from pasture-fed cattle and that obtained in winter from stall-fed animals, unless particular attention is paid to their diet, and that dirty milk is a menace rather than a blessing.

REFERENCES

1. *Brit. M. J.*, Jan. 28, 1928, p. 140.
2. *Lancet*, Jan. 28, 1928, p. 202.

ASSOCIATION NEWS

The New Field Museum of Natural History
Roosevelt Road in Grant Park

57TH ANNUAL MEETING OF THE A.P.H.A.

CHICAGO and the Middle West are eagerly looking forward to the 57th Annual Meeting to be held at Hotel Stevens, October 15-19. The Local Committee has been organized under the chairmanship of Dr. Louis E. Schmidt, and plans are being made in coöperation with the Association officers for the largest meeting we have ever had.

The last Annual Meeting in Chicago was held in 1918. While a successful one in many ways, it was held under disadvantages as the man power and energies of the nation were then directed toward one thing—success in war. Chicago has made wonderful strides in the last decade, not only in public health achievements but also in civic developments. The delegate to the 1918 meeting who has not been in that city since will experience a most agreeable surprise when he returns to Chicago this fall. He will find an entirely new skyline always in a state of change; a new and growing lake front park system, made by filling in Lake Michigan, beautified by magnificent buildings and monuments; spacious single and double-decked boulevards for the building of which whole city blocks were wrecked; improved railway terminal facilities, and an atmosphere of enthusiasm locally, which is equally as contagious as it is invigorating.

Chicago has truly won the unique distinction of being the Convention City of America. It has an abundance of the things which go to make a success of a meeting such as the American Public Health Association sponsors—where the delegates come to spend a week in seriously applying themselves to professional matters relating to public health, but where they are afforded relaxation in profitable entertainment. To this end the Chicago Local Committee is formulating its policies and directing its efforts.

The selection of Hotel Stevens as headquarters assures the best in the way of convention service. This hotel is the largest in the world, having over 3,000 guest rooms. It can not only accommodate all delegates and guests, but house

Municipal Pier

all convention activities under the one roof—meetings, exhibits, and entertainment features.

The Stevens is Chicago's newest hotel and is splendidly located with reference to railroad terminals and local transportion facilities. It is on Michigan Boulevard, famous the world over for its fashionable shops and brisk lake breezes, and overlooks Grant Park and Lake Michigan. This park holds the keystone position in Chicago's lake front park system and is being developed as one of the most elaborate and magnificent civic centers in the world. From his room in Hotel Stevens, one may look across the park and see the beautiful Buckingham Memorial Fountain with its gorgeous display of graceful water sprays. This fountain in display at night is a real inspiration. To the south stands the famous Marshall Field Museum of Natural History, one of the finest specimens of Grecian architecture on the continent, and costing over $7,500,000. Within this museum are acres of exhibit rooms where are shown thousands of priceless collections and rare specimens. Its collections of anthropological, botanical, geological and zoölogical exhibits rate with the world's best. Here may be seen some of the finest taxidermy and the finest collection of jewels in America. The visitor could spend weeks in this museum and still have much to see and learn. The directors of this institution have dispatched scores of scientific expeditions to all parts of the world collecting specimens, making new discoveries and seeking additional facts in many fields of natural history.

Soldiers' Field with its huge stadium is situated just south of the museum and harmonizes with it in architectural features. Here were held the famous Army-Navy football game of 1926, the great Tunney-Dempsey fight and the World's Eucharistic Congress of 1927. The stadium has seated as many as 150,000 people.

Beyond the park and extending eastward to the skyline at the horizon lies Lake Michigan. Projecting out of the water like tiny islands and sometimes

Soldiers' Field

mistaken for vessels may be seen the circular crib structures protecting Chicago's water works intakes. A little to the north one sees the Municipal Pier extending out into Lake Michigan nearly a mile. This structure is one of the most modern of its kind. It serves as the docking terminal for the fleet of freight and passenger vessels which operate out of Chicago, and at the extreme end has a spacious recreational center where hundreds of Chicago families spend the hot summer days in the comfort of fresh lake breezes. Up Michigan Boulevard a few blocks are the Art Museum, the Public Library and the statue group, "The Spirit of the Great Lakes." The former ranks among the best art galleries in the country, containing excellent examples of old masters and modern paintings and a collection of sculpture both ancient and modern.

The Local Committee will make ample provisions for our members to see Chicago. The thirty miles of boulevards connecting up Chicago's park system makes an auto trip about the city a real pleasure. Chicagoans love and make real use of their parks. The lake shore drive north through Lincoln Park is one of the most beautiful boulevards in America. Lincoln Park with its charming lagoons and quaint by-ways, its flower conservatory, zoölogical garden, athletic grounds, yacht harbor, bathing beaches, public golf course, and rifle range is a real playground for young and old, as well as a beauty spot such as few cities possess.

Buckingham Memorial Fountain in full play

The wide south side boulevards which begin at Grant Park, pass by Field Museum and Soldiers' Field along the lake front, and lead to Washington and Jackson Parks—The latter was the site of the World's Fair over a third of a century ago. Connecting these two parks is the famous Midway of the fair days, now part of the boulevard system, on the north side of which are clustered the buildings of the University of Chicago. The new Medical School and the chapel are imposing additions to the university buildings group. Jackson Park is the largest of the city's parks. On its Japanese Island of the World's Fair days still stands Cahokio Court House, the oldest public building in the Mississippi Valley. The public bathing

beach, the golf grounds, tennis courts and yacht harbor offer splendid recreational facilities. Washington Park is known for its numerous athletic grounds, its flower conservatory with sunken gardens, and Lorado Taft's famous statue, the "Fountain of Time" at the west end of the Midway. On the west side Columbus, Douglas, Garfield and Humbolt Parks rival in beauty and public service those parks located on the lake front. They are all interconnected by boulevards and are notable for their beauty as well as their recreational facilities. The flower conservatories in Garfield Park are as beautiful as any in America. The seasonal flower shows held there attract national attention.

The public health activities in Chicago are many and varied. The local committee will arrange for the proper introduction of delegates and admission to places of interest. The health officers will find Chicago's Health Department activities a model of efficiency and service. Research workers in medicine and public health will be given the opportunity to see much of the work of their professional colleagues at such institutions as the Chicago, Northwestern and Loyola Universities, the School of Medicine of the University of Illinois, and the McCormick Institute of Infectious Diseases. The Chicago Hospital clinics and Welfare stations will welcome our members. The public health engineers have offered them a wealth of interesting things to see in the activities of the Chicago Water Works, the Sanitary District of Chicago, and the milk and ventilation control work of the Health Department. The industrial hygienists will find much of interest to them in the great plants in the Chicago region, such as the Stock Yards, Western Electric Company, International Harvester Company, the Pullman Company, and the steel mills. The public health nursing activities, including welfare work, is splendidly organized in Chicago and Cook County. The public health group members in the Illinois District Nurses section are planning big things for the A. P. H. A. meeting this fall.

The Chicago meeting, in bringing together the representative public health workers of this continent, should be the high-water mark in the advance of the public health movement and begin a new era in the affairs of our Association.

A. P. H. A. AIDS CHAUTAUQUAS

The Association is coöperating with the Redpath and Swarthmore Chautauquas and the Milbank Memorial Fund in a program of public health education. This project is under the direction of the Committee of which S. J. Crumbine, M.D., is chairman. Lectures on public health and personal hygiene will be given under Chautauqua auspices in 291 small cities and towns in 14 northeastern states. Edward T. Devine, M.D., who has been temporarily engaged by the Association to assist in the project is working in close coöperation with the official health authorities and voluntary agencies in the states concerned.

DR. DEACON IN TEXAS

W. J. V. Deacon, M.D., of the Michigan State Health Department has been temporarily loaned to the Association for service under the direction of the Committee on Registration Area. Dr. Deacon is now in Texas with the State Department of Health to assist it in entering the registration area.

PARKER BILL PROGRESS

The Parker Bill, which provides for correlation of federal health services, with minor changes has passed the Senate. These changes must be agreed to by the House of Representatives.

REGIONAL MEETING IN PORTLAND, ORE., JUNE 18

PLANS for the first regional meeting of the Association are rapidly taking shape under the direction of William C. Hassler, M.D., *Chairman* of the Temporary Organizing Committee for the West.

The other members of this committee are: E. T. Hanley, M.D., Vice-Chairman; John J. Sippy, M.D., Secretary; J. L. Pomeroy, M.D.; George Parrish, M.D.; James J. Waring, M.D.; Robert A. Peers, M.D.; H. B. Hommon; William P. Shepard, M.D.; H. E. Young, M.D.; F. D. Stricker, M.D.; and W. F. Cogswell, M.D.

The meeting will be held in Portland, Ore., on June 18. The program calls for a full day's session with a round table luncheon and an evening meeting. All members of the Association are invited to attend the meeting and to participate in the discussion.

The tentative program will include the following:

1. **The Organization Objectives of the Western Branch.** WILLIAM C. HASSLER, M.D., San Francisco, Calif.
   Discussion, E. T. HANLEY, M.D., Seattle, Wash.
2. **Effect on Native Population of Immigration of Physical Defectives.** JAMES J. WARING, M.D., Denver, Colo.
   Discussion, JOHN G. ABELE, M.D., Portland, Ore.
3. **Is the Filipino a Menace from the Public Health Standpoint, and Should He Be Examined at the Point of Embarkation?** F. D. STRICKER, M.D., Portland, Ore.
   Discussion, DONALD J. FRICK, M.D., Los Angeles, Calif.
4. **The Value of Health Centers.** J. L. POMEROY, M.D., Los Angeles, Calif.
   Discussion, WILLIAM DEKLEINE, M.D., Salem, Ore.
5. **The Spread of Communicable Diseases from Transient Mexican Labor.** GEORGE PARRISH, M.D., Los Angeles, Calif.
   Discussion, JOHN J. SIPPY, M.D., Stockton, Calif.
6. **How to Put Community Health Surveys to Work.** W. F. WALKER, Dr. P. H., New York, N. Y.

The National Tuberculosis Association will hold its regular annual meeting in Portland during the week of June 18, and those travelling to this meeting from the East can take advantage of the summer tourist rates which are even lower than the 25 per cent reduction usually available to members attending Association meetings.

Further information concerning the regional meeting in Portland may be obtained from William C. Hassler, M.D. Department of Health, San Francisco, Calif.

NEW MEMBERS

Mrs. M. W. Ainsworth, Onawa, Ia., Red Cross County Public Health Nurse

Helen G. Andres, B.S., Baltimore, Md., Nutrition Director, Baltimore Dairy Council

Robert E. Andrews, M.D., Chicopee Falls, Mass., with The Fisk Rubber Company

Maude R. Borda, R.N., Millville, N. J., Executive Nurse, Cumberland County Health Association.

Manfred Bowditch, A.B., West Lynn, Mass., Industrial Hygienist, General Electric Company

William P. Brown, M.D., Ardmore, Pa., Medical Director, Pennsylvania Tuberculosis Society

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Edward Hochhauser, New York, N. Y., Executive Director, Committee for Care of the Jewish Tuberculous

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Clara Loitman, M.D., Boston, Mass., Supervisor of Nutrition Classes of Boston Public Schools

William C. Masslow, M.D., Forest Park, Ill., Health Commissioner

James H. McCall, M.D., Moundsville, W. Va., City-County Health Officer

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Blanche H. Rose, R.N., Grand Rapids, Mich., Executive Secretary, Grand Rapids Anti-Tuberculosis Society

Louis Saur, M.D., Norwood, O., Health Commissioner

Dora E. Snyder, B.S., Jefferson City, Mo., Assistant Bacteriologist, State Board of Health

Frank M. Sulzman, Troy, N. Y., Training Schools, Troy Hospital and Cohoes Hospital

Mary W. Taylor, B.S., Chicago, Ill., Librarian, Elizabeth McCormick Memorial Fund

Grace Theodoropoulos, St. Louis, Mo., Educational Director, Pevely Dairy Company

Leslie Waddill, D.D.S., Pittsburgh, Pa., Member Pittsburgh District Dairy Council

Carl J. Wallen, D.V.M., Redlands, Calif., Field Veterinarian

George Walter, M.D., Boston, Mass., on Staff of Life Extension Institute (supervising in-

dustrial and other examinations)

Ruth Cole Warwick, M.D., Westmoreland Depot, N. H. (Assoc.)

Alice J. Whittier, R.N., Delaware, O., Public Health Nurse

Verna Willis, M.S., Jefferson City, Mo., Assistant Bacteriologist, State Board of Health Laboratory

Belle Wood-Comstock, M.D., Los Angeles, California, Chairman of Public Health, Los Angeles District of California Federation of Women's Club

DECEASED MEMBERS AND FELLOWS

Clarence W. Bassett, M.D., Sharon, Conn. Member, elected 1920.

Chauncey F. Chapman, M.D., Lincoln Health Dept., Lincoln, Nebr. Member, elected 1920.

H. A. Duemling, M.D., Fort Wayne, Ind. Member, elected 1920.

Perry D. Gaunt, M.D., District Health Dept., Sheboygan, Wis. Member, elected 1923.

Prof. James O. Jordan, Boston, Mass. Member, elected 1905, Fellow 1922.

Francis M. Munson, M.D., La Plata, Md. Member, elected 1924, Fellow 1927.

Mrs. S. R. Prentiss, Bangor, Me. Member, elected 1912.

Tom Rosenfield, Rock Island, Ill. Member, elected 1921.

Dr. F. H. Lee, Canaan, Conn. Member, elected 1919.

LETTER TO THE EDITOR

TO THE EDITOR:

Realizing, in the summer of 1925, that Tampa, Fla., should have a modern health department, the City Commissioners endeavored to secure as health officer the best man they could find. Once this became known, they were swamped with applications. Unable to decide among these, they sought the advice of the Board of Trade's Committee on Public Health and Hospitals.

The name of E. C. Levy, M.D., formerly Chief Health Officer and later Director of Public Welfare of Richmond, Va., was not in the list of applicants, but the outstanding character of his work, his national reputation, and the endorsements which their own inquiries brought from high sources led the committee to make a unanimous recommendation in his favor. The City Commission proffered the position to Dr. Levy and he became City Health Officer of Tampa in September, 1925.

He found an utterly demoralized situation. A few employes, without head or organization, constituted the Health Department. Many and peculiar difficulties had to be met. For example, during this period any public statement relating to bad sanitary conditions which needed correction or to the prevalence of contagious disease was resented in certain quarters as harmful to the community. This was shown during the smallpox outbreak which started when Dr. Levy had been here only a little over three months. But here, as always, he stood his ground. He won his fight, both against this opposition and against the epidemic.

When Dr. Levy came to Tampa, the milk supply was about as bad as can be conceived. All previous efforts to improve the situation had failed. Our efforts to secure results through the health authorities had brought about little or no improvement and we had almost lost hope. Frankly, we were at first discouraged at the deliberate manner in which Dr. Levy went at this particular problem, but he called attention to the lack of success which had attended previous lines of action and asked for reasonable time to show results. He outlined his program and

showed how each step had to be established before the next could be taken. As the difficulties were overcome, one by one, those who had doubted were convinced. Tampa has now a thoroughly satisfactory milk supply.

Never discouraged, never yielding to popular clamor either in the direction of courting failure by undue haste or of letting up in a course once decided upon, he succeeded not only in giving Tampa the kind of health department that she had so long needed, but also in winning over those who had been indifferent.

By whatever standard measured, Dr. Levy made good. No single thing perhaps can better substantiate this claim than the practically unanimous endorsement of his work by the medical profession of Tampa. Since his retirement the Hillsborough County Medical Society has elected him an honorary member and is planning to give him a testimonial dinner.

The real purpose of this communication is to make it plain that politics, and politics alone, is responsible for the fact that Dr. Levy is not still in office. Tampa has recently been through a heated and long-drawn-out political campaign. As in many other Florida cities, collapse of the boom brought about conditions which were improperly attributed to the local government. In Tampa this went so far as to cause attacks not only on the City Commissioners but on commission government itself. Finally the people voted in favor of a charter giving Tampa the old system of a city council elected by wards, under the name of "representatives" elected by "districts."

This change in the basic form of government was the only issue considered by the people in voting for the new charter. But in this new charter there is a section relating to the City Health Officer. No training or experience in public health work is required, but he must be a "physician authorized to engage in the practice of medicine under the laws of the State of Florida." The County Medical Society, through a committee, protested against this provision before the board which was drafting the charter, but this protest was ignored. The people of Tampa had no opportunity to express their views on this particular section. They could only accept or reject the charter as a whole.

Dr. Levy had not, of course, taken the examination of the State Board when he came to Florida to accept the position of City Health Officer of Tampa. At that time Tampa did not have, and no other Florida city at the present time has, any such requirement, nor does the state demand this of its health officer. Even had Dr. Levy been disposed to do so, he had no opportunity to meet this requirement after the adoption of the new charter, since no meeting of the State Board of Medical Examiners was held in the short interval between that time and the time that the charter went into effect.

No reason for not reappointing Dr. Levy was given except that he was ineligible under the new charter.

Tampa has thus, purely through politics, lost a splendid health officer, one who, in the two years and four months that he was in office accomplished great things under most abnormal and trying conditions and who, had he been allowed to continue, would beyond question have given Tampa the same reputation for advanced public health work which, through his efforts, has been enjoyed by his native city of Richmond.

In order not to be misunderstood, I wish to state that I knew Dr. Levy only by reputation before he came to Tampa and since then only through his work here. Such things as have recently happened here and in Chicago should not be.

JOHN H. MILLS, M.D.
907 17th Avenue,
Tampa, Florida.
March 24, 1928.

PUBLIC HEALTH ADMINISTRATION

HENRY F. VAUGHAN, D. P. H.

Smallpox Prevention in New Haven—There have only been 11 cases of smallpox in New Haven during the past twenty years, and none during the past three years until the recent case in January. (There was 1 case reported in January and none in February, 1928.)

As the people of New Haven were exposed to 5 different cases of smallpox during the month of January, only one of which was a resident of the city proper, a determined effort was made to secure the vaccination and revaccination of the city's inhabitants. Of the 5 cases referred to, 2 were in an institution in West Haven, 1 was in the town of Hamden, and the 4th lived about twenty-five miles from New Haven, but was in New Haven up until the onset of the disease.

It is estimated that 100,000 people were vaccinated, 45,000 by the health department, and 55,000 in the industrial plants and by private physicians. There has been no spread of infection. The cost to the city of New Haven including hospitalization will probably be under $7000.00. The percentage of "takes" in what was considered a well vaccinated community was surprisingly high as shown by figures compiled by the University Health Service, which organization vaccinated 2138 individuals. Of this number 1744 were satisfactorily followed, and of this latter group there were 790, or 47.5 per cent, who gave evidence of a "take"; 808 or 48.7 per cent were immune, indicating protection from smallpox from previous vaccination, and 63 or 3.8 per cent were failures from the first attempt. Those in this last mentioned group were revaccinated. (The experience of New Haven, which has always been considered a well vaccinated community, and which has religiously practiced vaccination among school children, again indicates that no community can be adequately protected against smallpox unless it practices not only vaccination but revaccination. Had hemorrhagic smallpox secured a foothold in New Haven the result might have been as disastrous as Detroit's experience in 1924. Revaccination is essential.)—John L. Rice, M. D., Prevention of Smallpox Epidemic; *Monthly Bull.*, New Haven Department of Health, LV, 2 (Feb.), 1928.

Tennessee Manual for County Health Departments—Under the direction of Dr. E. L. Bishop, State Health Commissioner of Tennessee, Dr. Joseph W. Mountin has compiled a most interesting manual for the conduct of County Health Departments in the State of Tennessee. The powers and duties of local Boards of Health are defined and particular emphasis is laid upon the relationship between the local units and the state department of health. The administrative features are given in considerable detail. (The reviewer has never seen a more complete document which outlines in a concise and clear manner the organizational features and the control procedures to be followed in a local rural health unit which depends for its existence largely upon a supervisory control system emanating from a state department of health. The manual has appeared in mimeograph form and consists of 165 pages of information which is invaluable to the rural public health administrator.)

Manual for Conduct of County Health Departments, Tennessee State Department of Public Health, Dr. E. L. Bishop, Commissioner.

Diphtheria—"How Complete is Our Protection?"—The *Health Officers' News Letter* issued by the Committee on Administrative Practice for March, 1928, presents some very interesting figures, supplied by the health officers in cities of 10,000 population and over, showing the percentage of preschool and school children immunized against diphtheria. Information was secured from 129 cities, representing a population of over 14,000,000. It was found that approximately 12 per cent of the preschool children in this group are protected against diphtheria and 33 per cent of the grade school group.

The immunization program appears to have been more extensive in Eastern cities over 70,000 among the school age group where the highest percentage of immunity occurs (42.7 per cent), while the lowest percentage (6.4 per cent) is among the preschool children in Western cities from 10,000 to 30,000 population.

From the tabulation carried in this report it is obvious that:

> . . . our diphtheria immunization program has not yet attained such a degree of completeness that we may rest content. The percentage of grade school children still susceptible is sufficiently high to permit the occurrence of a large number of cases, or even a modest epidemic, as did in fact happen in many communities last year. Under existing circumstances the preschool population cannot escape. Health officers would do well to bring these facts before their communities and to encourage a system of reporting successful immunizations so that the local progress of prevention can be charted, without which we proceed blindly in our campaign for greater use of toxin-antitoxin. . . .

Public Health Administration in New Jersey—In 1864, largely through the influence of Dr. Ezra M. Hunt, who was one of the pioneers in the public health movement in that state (who became the tenth President of the A. P. H. A.), the New Jersey legislature appointed a state commission to report upon the general sanitary conditions of that commonwealth. The Civil War retarded progress in sanitary matters, but a second commission was appointed in 1873 with the same chairman. In 1877 the State Board of Health was created and Dr. Hunt was appointed its secretary. In 1880 a law was passed making compulsory the formation of local boards of health.

The major activities of the state board during the decade ending in 1890 were concerned largely with outbreaks of smallpox, diphtheria and typhoid fever, together with the ever-present malaria which probably included the fevers of obscure origin which were supposedly due to the miasm generated in the marshlands of the Passaic and other river valleys. During the next decade there was a more concerted search for the causes of disease and the isolation of those suffering from specific communicable infection. Isolation hospitals under health board management were advocated. In 1895 a law was enacted requiring physicians to report certain communicable diseases to local health boards. The typhoid fever death rate was reduced from 54 per 100,000 in 1890 to 18 in 1900. There was a great advance in sanitary engineering practice with special emphasis upon the prevention of water-borne typhoid fever.

Soon after the beginning of the new century there were legislative acts providing for medical examination of school children, and creating the State Sewerage Commission. During this decade laboratory service expanded, largely through the influence and energetic work of R. B. Fitz Randolph. The number of local sanitary districts had grown from 200 in 1880 to 434 in 1902.

In 1908 the State Board of Health

was reorganized and combined with the State Sewerage Commission. In 1911 the staff of the State Board of Health consisted of 45 employes, and by 1920 it had increased to 150. In 1915 the State Board of Health was succeeded by the State Department of Health.

Sedgwick played a leading part in the progressive trend of health work in New Jersey through the influence of his students, trained sanitarians, among whom were Parker, Winslow and Wells, at Montclair and Gunn, Osborne, and McNutt in "The Oranges."—D. C. Bowen, A Half Century of Public Health in New Jersey, *Pub. Health News,* Dept. of Health, New Jersey, XIII; 35 (Jan.-Feb.), 1928.

Michigan Health Officers' Manual—Rules and regulations for the control of communicable diseases revised and adopted January 1, 1928, have been published by Dr. Guy L. Kiefer, Commissioner, Michigan Department of Health. The bulletin which consists of some 60 pages is divided into four sections, the first of which deals with general considerations involved, including the authority given to the State Health Commissioner and the State Advisory Council of health in promulgating regulations. There are then propounded certain questions which frequently arise in the mind of the layman with respect to the control of communicable diseases, and these are answered in full.

The second section deals with the scope of the code and specifies the diseases which are declared to be reportable.

The third section consists of definitions of such important control measures as quarantining and isolation, and the general practice to be pursued with respect to carriers, contacts, exclusion from school, and the supervision of contagious diseases on dairy farms.

The fourth section gives the detailed procedure for the administrative control of each communicable disease.

(The code is not unlike that adopted by the American Public Health Association, but is to be especially commended for the clear and concise manner in which the regulations have been enumerated.)—Dr. Guy L. Kiefer, Commissioner, Michigan Department of Health, *Health Officers' Manual.*

LABORATORY

C. C. YOUNG

DISSOCIATION OF THE RAWLINGS STRAINS OF B. TYPHOSUS

NEWTON W. LARKUM, PH.D.

Michigan Department of Health, Lansing, Mich.

THE tendency toward dissociation of bacteria in general and of the organisms of the colon-typhoid group in particular is well recognized; yet very little attention has been paid to the question of the extent of variation or to the significance of many of the varieties encountered. When the bacterium under consideration is other than an animal or human pathogen, the time required for a complete and careful study can well be afforded, but when organisms of such immunological significance as those of the Rawlings strain of *B. typhosus* are concerned, such discoveries as have been made should be applied as quickly as possible. Certainly, uniformity in the cultures of this strain, used in practically all laboratories for the production of the antityphoid vaccine, should be a prime requisite. The prescription of this strain was obviously intended to satisfy such a condition, yet the evidence found in the literature of the past decade is scarcely necessary to indicate to what an extent the facts fail to correspond to the theory. Many who have had occasion to work with two or more subcultures of *B. typhosus* Rawlings have noted certain differences. Such observations have seldom been published, but a study of Robinson's [2-3] two papers on antigenic differences in strains of *B. typhosus* is sufficient to indicate the wide differences that occur. This knowledge of variations even within a well-studied and much used bacterial strain only awaited the development of the subject of "Microbic Dissociation" for its explanation and extension.

There is no need in this paper to enter into a discussion of "Microbic Dissociation." Hadley [1] has thoroughly covered the subject. It may be well, however, to indicate briefly some of the major conceptions, first of which is the well established fact that bacteria may and do vary. Within a well established species wide differences in colony appearance, biologic activity, antigenic and physiological characters may exist. However one may feel about accepting the concept of extremes of variation characterized by the S (smooth or normal type) and the R (rough or extreme variant) and the many intermediate forms less definitely described, one cannot help but consider the data which show variations in virulence and antigenic powers associated with certain colony forms. Assuming for the present, that one can definitely separate at least two types, how are they to be recognized? The distinguishing characteristics of the two types, S and R, are mentioned in the following Table I taken from Hadley's review.

Other characteristics might be included, but the above are sufficient for present purposes. While these properties of the two variants serve to identify them, they have other significances which may be readily noticed. Outstanding among these are their virulence

and transformations in immune serum. To come directly to the point about which this paper is solely concerned, the R type, being the less virulent, that therapy or prophylaxis is best which assures a transformation from the (virulent) S to the (non-virulent) R type or at least which will not interfere with what is apparently a *normal* transformation in this direction. In the same sense, that organism which produces an antiserum in which the S (virulent) type is transformed to an R (non-virulent) type and in which there is no tendency for the R types to become S forms, is the one which should be used in the preparation of antityphoid vaccines. In other words, the use of any form other than the S type in vaccines is, on the basis of such evidence as we now possess, unwarranted. With these facts in mind, an investigation of several cultures of *B. typhosus* Rawlings was undertaken not alone to determine what type was actually in use in various laboratories, but to verify certain of the statements made above, particularly those referring to transformations in immune sera. The relative virulence of the two types is apparently well-established, especially in view of the recent contributions of Webster and Burns.[6]

TABLE I

S TYPE
Homogeneous clouding in broth
Normal suspension in 0.8% salt solution
Colonies, smooth, regular, convex
In motile species, active
Carries double antigen (S and O)
If a pathogen—virulent
Sensitive to bacteriophage
Transformed to R in S immune serum
Not transformed in R immune serum
R TYPE
Agglutinative growth in broth
Sedimentary suspension in 0.8% salt solution
Colonies rough, irregular, flat
In motile species, non-motile
Often pure R (may have some O or S)
Slightly or non-virulent
Less sensitive to bacteriophage
Not transformed in S immune serum
Transformed to S in R immune serum

EXPERIMENTAL

Six agar slant cultures of *B. typhosus* Rawlings, subcultures from the strain used in the preparation of vaccines, were received from as many laboratories. Although the various examinations were made as soon as possible after receipt of the cultures, lest the objection be raised that variation occurred during the investigation, transfers were made on agar slants which experience has shown tends to prevent variation for a time at least. Table II

TABLE II

Strain	Colony Type	Growth in broth	Motility	Agglutination in 0.8% salt sol.	Susceptibility to bacteriophage	Agglutination with antisera S	Agglutination with antisera R	Per Cent Transformation[1] in 10% immune serum broth S serum	Per Cent Transformation[1] in 10% immune serum broth R serum	Per Cent Transformation in blood broth	Virulence[2]
1	R	Settles	—	Partial	++++[3]	+	—	50%S	50%S	50%S	—
2	R	Turbid	—	None	++++	+	—	20%S	40%S	60%S	0
3	S	Turbid	+	None	++++	+	+	40%R	40%R	100%R	0
4	R	Turbid	+	None	++++	+	+	20%S	70%S	50%S	0
5	R	Turbid	—	Partial	++++	+	—	30%S	30%S	10%S	+
6	R	Turbid	+	None	++++	+	—	30%S	30%S	50%S	+
S	S	Turbid	+	None	++++	+	—	90%R	10%R	100%S	+
R	R	Settles	—	Complete	++++	—	+	30%S	90%S	90%S	—

1. Maximum: based on colony appearance
2. ++++: complete lysis
[2] Virulence for guinea pigs using two 18-hour slants, intraperitoneal injection

gives the results of these examinations. Two other cultures are included. These have been under observation for several months and are considered representative S and R types, respectively. They were used in the preparation of the R and S. antisera used.

Some further information is necessary before entering into a discussion of the results shown in Table II, especially concerning colony types. No single criterion for the identification of the culture type is so significant as the colony appearance. In many investigations little or no effort is made to go further than to record the colony appearance. That such a procedure is ill-advised can be readily seen from the data presented here. Apparent R types proved on further study to possess many of the characteristics of the S form. Examination of the colonies formed by the above cultures revealed several facts not shown in the table. Each of the strains referred to was apparently homogeneous. There were no variations among the colonies of a single strain when freshly subcultured from an agar slant. On the other hand, the so-called R types were by no means identical. Strain 1 most closely resembled the stock R, while strain 3 was indistinguishable from the known S form. The other four most decidedly favored the R type in appearance. With the exception of 1, all of the strains grew in broth in a manner resembling the S type. Motility tests are misleading because of the fact that here individual bacteria rather than masses of bacteria must be considered. One can usually find some motile organisms in any type of a motile species. However, the difference between the stock S and R was sufficiently marked so that a similar difference determined the question of positive or negative motility with the other strains.

It is not within the province of this paper to consider such theoretical and controversial subjects as the relation of agglutinability or susceptibility to bacteriophagy, to dissociation. Nor indeed do the few virulence tests performed shed much light on the virulence of the strains tested. If, however, each of the strains is considered with respect to all the data presented, it is possible to reach a conclusion as to its nature. Strain 1 most closely resembles an R type and it is likely that the majority of investigators with experience in this field would classify it as such. Strain 3 would be called an S type. The other four strains cannot be classified as S or R. They have certain attributes of both types, yet one conclusion, at least, can be made. *Five of the six strains studied were not S types.*

There remain to be considered two questions, one of which was raised earlier in the paper: does growth in R immune serum tend to prevent the S→R transformation and to promote the development of S types from R; and how may one obtain the S type for use in the preparation of vaccines. The literature contains but one paper dealing with the first question. Soule [4] working with *B. subtilis* showed that there is a tendency of R antiserum, not only to preserve the S type as such, but to bring about the R→S transformation. The same writer while recognizing the futility of generalization points out that should these conclusions hold for pathogenic organisms, there is a very real danger from attempting artificial immunization with R type strains. To consider typhoid fever as an example, two situations may be imagined, one in which the individual is invaded with R type organisms, as more frequently happens if carriers are the source of the bacilli; the other where an S type bacillus is concerned. In the first instance, the serum being anti-R, S type organisms result from the invasion. In the second, there is no tendency for the less virulent R type to be formed as happens when anti-S serum is present.

Referring again to Table I, it will be seen that, grown in 10 per cent S serum broth, S type organisms dissociate to R. This fact finds ample confirmation in the literature (Hadley). R types have a tendency to remain as such. It will be seen that even here there is some reversion of R→S, but comparison with growth in normal and R immune serum broth shows it to be relatively slight. In R and in normal serum broth, the S type remains S while the R has a very marked tendency to become S.

S types for immunization purposes may be produced by growth of the strain in question in R anti-serum. Frequently, however, such serums are not available, and some strains are less affected than others by such treatment. That animal passage gives a satisfactory solution to the problem is indicated by the following experiment. Cultures from several R type colonies were injected intraperitoneally into guinea pigs using the washings from two agar slants. Twenty-four hours later, heart's blood cultures were taken from dead as well as surviving animals and in none of 26 cultures was an organism other than *B. typhosus* obtained. All of the organisms were of the S type with the exception of those obtained from the animals receiving the stock R culture. Todd [5] observed that extreme R type cultures of hemolytic streptococci would not revert to S types on animal passage. The result of the above experiment would indicate that the same is true for typhoid strains. Except when extreme dissociation has occurred organisms may be converted into S types. Thus, it is recommended that frequent animal passages should be made of cultures of *B. typhosus* Rawlings if they are to be used in the preparation of anti-typhoid vaccines.

CONCLUSIONS

Five of 6 strains of *B. typhosus* examined with respect to their degree of dissociation were found to be other than S type.

The report of Soule that growth of R types in S immune serum results in the production of S types, and that the tendency of S types to dissociate to R is inhibited by such serum was confirmed for the typhoid bacillus.

Passage of forms other than the extreme R type through guinea pigs results in a reversion to pure S types.

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VITAL STATISTICS

LOUIS I. DUBLIN, PH.D.

Infant and **Maternal Mortality in the United States**—In the period for 1915 to 1924 there was a decrease of 29 per cent in the total infant mortality rate in the registration area. The decreases in the rates for the urban and rural areas were very similar—30 per cent for the urban and 27 per cent for the rural. The improvements in the rate for white infants in the total registration area, in the urban area, and in the rural area are strikingly similar—32 per cent, 32 per cent, and 31 per cent respectively. The mortality rate among colored babies in the country has decreased 42 per cent in the decade under consideration. This is interesting in view of the fact that undoubtedly no class of the infant population has been less affected by so-called infant welfare work.

Unfortunately the United States cannot show a downward trend in maternal mortality. There was a rise of 8 per cent in maternal mortality from all puerperal causes in the total registration area from 1915 to 1924. In urban areas there has been a rise of 14 per cent—from 6.4 to 7.3 per 1,000 live births. The rural areas show an increase of 5 per cent. The only decrease shown in the maternal mortality from all puerperal causes is in the rate for white mothers in rural sections, which has fallen from 5.5 to 5.1—a decrease of 7 per cent. In the total registration area the rise in the rate for whites is very slight—less than 2 per cent—but in urban areas alone the the rise has been 11 per cent. The rates for colored mothers show increases in the total registration area, in the urban, and in the rural area, of 11 per cent, 17 per cent, and 34 per cent, respectively. Deaths from puerperal septicemia comprised over 36 per cent of the total maternal mortality. Though there is a slight increase from this cause in the total urban rate and in the rates of white city women and colored country women, in every other instance the rates show a tendency either to fall or to remain more or less stationary. In other accidents of labor (puerperal hemorrhage having been eliminated) and albuminuria and convulsions—there seems to be a slight rising tendency. The rate for the former has risen 13.3 per cent and for the latter more than 7.5 per cent.—E. Blanche Sterling. *Pub. Health Rep.* 43:497-503 (Mar. 2), 1928.

Demographic Statistics for Germany—The average length of life, in 1900-1911, in the German empire was 49 years. The total number of deaths dropped from 1,261,000 (30.6 per 1,000) in 1872, with some fluctuations of the total, to 1,206,000 (22.5 per 1,000) in 1897, and to 1,154,000 (18.1 per 1,000) in 1909, the year in which, for the last time, more than 2 million births were recorded. In the last normal year, before the World War (1913), the number of deaths had dropped to 1,061,000 (15.8 per 1,000). In 1923, 1924 and 1925 the total number of deaths was, respectively, 901,000 (14.6 per 1,000), 802,000 (12.9 per 1,000), and 788,000 (12.6 per 1,000).

The birth rate increased up to 1901, since which year there has been a decline. From 1872 to 1874 the total number of births ranged from 1,700,000 to 1,750,000, and from 1875 to 1890 the range was between 1,750,000 and 1,840,000. Between 1891 and 1897 it rose, with slight fluctuations, to 1,991,000.

The decade from 1898 to 1909 showed the greatest annual totals of births; they run over 2 million. Since 1909 the figures have again slowly declined to 1,874,000 in 1914. The years 1923, 1924 and 1925 showed a more uniform picture, the total births in those years having been, respectively, 1,340,000, 1,314,000 and 1,335,000. Comparative figures reveal a slow decline in the birth rate from 40 plus per 1,000 population up to 1879, to 38 per 1,000 in 1888 (38 was reached again in 1891 and 1893). In 1899 the rate fell to 37 and in 1902 to 36.2 per 1,000. In 1906 a rate of 34 per 1,000 was attained for the last time; in 1908 the rate dropped to 33. Then the rate dropped abruptly to 27.6 during the second, the last normal, quarter in 1914. From 1923 to 1925 the figures are fairly uniform: 21.7, 21.1 and 21.3, respectively. The larger cities in spite of a high percentage of marriages, had only 14.2 living births per 1,000 of population; Berlin had a birth rate of only 9.5. The rural sections are rapidly coming to follow the example of the larger cities and the upper classes. In 1898 the excess of births over deaths for the German empire was 15.6 per 1,000 population (the highest figure); the average figure for the period 1871-1880 was 11.9; for 1881-1890, 11.7; for 1891-1900, 13.9, and for 1901-1910, 14.3. For 1913 the last normal year before the war, the excess of births over deaths was only 12.4 per 1,000. The excess of births over deaths in 1920 was 10.8, and in 1921 it rose even to 11.3. But even this peak of the postwar figures was under the figure for 1913. During the period from 1922 to 1925 the figures were fairly uniform, ranging around 8.1 per 1,000, as follows: 8.5, 7.1 (height of the economic depression due to the decline of the mark), 8.2 and 8.7, respectively. The birth rate and the death rate are both declining, but the birth rate is declining more rapidly than the death rate. —*J. A. M. A.*, 90:787 (Mar. 10), 1928.

Maternal Mortality in Canada—The special inquiry into maternal mortality in Canada has been completed after several years of study and the report was issued at the beginning of this year. There were 237,199 living births from July, 1925, to July, 1926, and 1,532 of the mothers died from maternal causes, giving a mortality rate of 6.4 per 1,000 living births. The ages of these mothers varied between 15 and 48 years with an average age of 31.1 years. Three hundred and forty-nine were primiparae and 963 were multiparae. These latter 963 mothers left 4,305 motherless children, an average of 4.5 children per mother.

In 385 cases (25 per cent of total) the birth occurred in a hospital; 48, or 3 per cent, were attended by midwives. In 128 cases, or 8 per cent, of the total the doctor was not called until the patient was in labor. In 27 cases the doctor was not called until the patient was dying and in 91 the doctor was not called until several days after the birth, while in 101 there was no doctor present at any time during the birth or after it. Only 230, or 15 per cent, of the mothers had any prenatal care and in 40 of these the instructions were not followed. In 110 cases, death occurred before labor began.

Puerperal septicemia was given as the cause of death in 418, or 27 per cent, of the cases but this percentage would probably be raised if the histories had been more fully given in some cases. Hemorrhage was given as the cause of death in 357, or 23 per cent, of the total, heart disease in 226 cases, and eclampsia in 195 cases. Influenza and pneumonia, singly or together, had an influence on the mortality in 132 cases, tuberculosis in 96, embolus and dystocia in 87 each, nephritis in 80, placenta praevia in 76, shock in 63, anemia in 44, ectopic pregnancy in 33, phlebitis in 22 and veneral disease in only 9 cases. Previous pregnancies, too frequently and at too short

intervals, were mentioned in 19 cases, 67 patients were called overworked with the care of their other children and the home and 27 said to have had insufficient sleep and rest. The general health of the patient was given as poor or bad in 153 cases, 30 had serious infections of the teeth, and 10 infected tonsils.

Forceps were used in 289 cases, or 19 per cent of the total, and 136 operations were performed. Pituitrin was used in 327 cases, or 21 per cent of the total and rupture of the uterus was reported in 3 of these cases. In 5 cases it was used before labor, in the first stage in 9 instances, in the second stage 123 times, and in the third stage, in 32 cases and postpartum in 50 cases. During or after caesarian section it was used in 11 cases. —Department of Health, Canada. *Pub. No. 37.* The Little Blue Books National Series No. 1, 1928.

Vital Statistics in Connecticut, 1927—Connecticut in 1927 had the lowest death rate in the 78 years for which the vital statistics of the state are available, according to a provisional summary issued by the State Department of Health. The death rate last year was 10.5 for each 1,000 population, or 16,661 deaths in an estimated population of 1,586,435. During the same year 28,473 births were reported. In 1925 the death rate was 11.6; in 1924 it was 11.3 and in 1923 it was 12. Last year's records also show the lowest infant mortality in the history of Connecticut, 60 per 1,000 live births.

The death rate from typhoid fever during 1927 reached a new minimum of 1.1 for each 100,000 population, there being 17 deaths in 1927 against 29 deaths, a rate of 1.8, from this disease in 1926. The typhoid death rate has been falling steadily from a maximum of 41.8 in 1890. The 1927 death rate for measles showed a sharp drop, from 195 deaths, a rate of 12.5 for each 100,000 population, in 1926, to 21 deaths, a rate of 1.3 in 1927. The scarlet fever death rate shows a steady decrease, from 53 deaths, a rate of 3.6 in 1923 to 22 deaths, a rate of 1.4 in 1927. Whooping cough during 1927 had the lowest death rate in the history of the state, there being 40 deaths, a rate of 2.5 and in 1926, 95 deaths, a rate of 6.1. The death rate from diphtheria showed an increase in 1927 over that of 1926. The total deaths in 1927 were 94, a rate of 5.9; compared with 83 deaths, a rate of 5.3 in 1926. The 1927 diphtheria death rate is next to the lowest in the history of the state, the 1926 rate being the lowest on record, the lowest rate until that time having been 8.2 in 1921. The highest diphtheria rate recorded was 97.7 per 100,000 in 1889. In 1923 there were 187 diphtheria deaths, a rate of 12.7; in 1924, 168 deaths, a rate of 11.2 and in 1925, 126 deaths, a rate of 8.2.

The death rate from influenza in 1927 was 18.8, but little more than half the 1926 rate of 35.9. There has been a downward trend in the tuberculosis death rate since 1918, but the number of cases for the last five years has been practically stationary. Last year there were 925 deaths from pulmonary tuberculosis, a rate of 58.3 and 134 deaths from other forms of tuberculosis, a rate of 8.4. There was a distinct upward trend in the cancer death rate to 1925, but since that year, because of some unknown factor, the death rate has been practically stationary. There were 1,646 cancer deaths a rate of 107.6 in 1925; 1,663 deaths, a rate of 106.7 in 1926 and 1,683 deaths, a rate of 106.1 in 1927. The pneumonia death rate in 1927 was very low, 84.4, the first time in recent years, according to Commissioner Osborn, that the rate has been below 100. In 1926 there were 1,693 deaths, a rate of 108.6. In 1927 there were 1,339 deaths.

Poliomyelitis showed an increase from 6 to 16 deaths from 1926 to 1927, due to the outbreak last year, and the death

rate showed a corresponding increase from 0.4 to 1.0. Cerebrospinal meningitis had a death rate of 0.6 for both 1926 and 1927, there being 10 deaths from this disease in each year. The lower infantile mortality rate in 1927 was in a considerable measure due to the drop in the death rate of children under 2 years old of diarrhea and enteritis from 16 in 1926 to 11.1 in 1927. There were 188 suicides in the state in 1927, a rate of 11.9 per 100,000, while during the preceding year there were 216 deaths, a rate of 13.9, which was the highest for the 5-year period. Deaths from accident in 1927 numbered 1,051, a rate of 66.2, the lowest for the 5-year period. The highest accident death rate during the 5 years 72.6, representing 1,111 deaths, was in 1925.—*Hartford Courant*, Feb. 4, 1928.

Correlations Between the Death Rate from Diabetes Mellitus and Certain Demographic Factors—An inquiry into the relationship between the diabetes death rate and some demographic factors in various localities showed the following numerically significant correlations:

There was a high negative correlation with the percentage of negroes in the population. In 66 large cities this was — 0.538 with the coefficient 9.1 times its probable error; in 34 states it was —0.731 and the coefficient 13.5 times its probable error. There was a positive partial correlation in the large cities with the percentages of the total population born in Ireland (+ 0.561), Germany (+ 0.325), Italy (+ 0.380), and Russia (+0.441). The zero order correlation with the percentage of Polish population was insignificant, but correction for age gave a first order coefficient of + 0.410 which was 5.9 times its probable error.

The zero order correlation between the diabetes mortality (corrected for age and sex) and the proportion of the population filing income tax returns was + 0.727 which is 13.2 times its probable error. The correlation with the cancer death rate was + 0.842, which was 38.3 times its probable error. Tuberculosis of the lungs had a significant negative correlation and organic heart disease a significant positive correlation, acute nephritis and Bright's disease and pneumonia have insignificant correlations, the former correlation being negative and the latter positive. The correlation with incidence of defective and deficient teeth among drafted men was + 0.314 almost 3.0 times its probable error, correction for percentage of population residing in urban areas reduces this to + 0.052 which is 0.4 times its probable error. The correlation of the age- and sex-adjusted death rate from organic heart disease with the incidence of defective and deficient teeth gave a coefficient 5.5 times its probable error. Both diabetes and cancer mortality show significant positive correlations with the incidence of obesity among drafted men, the diabetes coefficient being 4.6 times its probable error and that of cancer 6.2 times the probable error.—Robert Jordan, *Am. J. Hyg.* 8:55-67 (Jan.), 1928.

The Age Distribution of Poliomyelitis—Approximately 50 per cent of all cases of poliomyelitis occur under 5 years of age, 80 per cent under 10 years, 90 per cent under 15 and 95 per cent under 20 years in urban communities, but in rural areas it is more evenly distributed through the older age groups. A comparison with measles and diphtheria showed the age distribution of the three diseases to be of the same order and the incidence in the various age groups to be directly proportional to concentration of the population.

There is strong inferential evidence that the majority of individuals become immune to the virus of poliomyelitis and that this immunization takes place relatively earlier in life with increased

density of population, supporting the theory that the virus is spread by contact to a great extent through abortive cases and healthy carriers. The frequency with which the different viruses cause disease or subclinical immunity has been formulated as follows: of susceptible individuals exposed to measles 1 out of 1 develops the disease; of those exposed to diphtheria 1 out of 10 develops the disease and 9 out of 10, subclinical immunity; of 100 susceptible individuals exposed to poliomyelitis 1 develops the disease and 99 subclinical immunity. Consequently there are no healthy measles carriers, in diphtheria there are about 9 potential healthy carriers to every case, and in poliomyelitis about 99 carriers to each recognized case.—W. Lloyd Aycock—The Significance of the Age Distribution of Poliomyelitis. Evidence of Transmission through Contact.—*Am. J. Hyg.* 8:35-54 (Jan.), 1928.

A Study of the Use of Convalescent Measles Serum in Children's Institutions—There were 945 cases and 51 deaths from measles in 40 children's institutions in New York State in 1923. Seventy-seven per cent of the deaths were in children under 3 years of age, about the same proportion as in the state at large. There were no deaths among the 6 cases in children less than 6 months of age. The highest fatality rate was in children between 6 and 11 months of age, after this age it declined rapidly. There were only 3 deaths among the 560 cases in children aged 5-19 years, this fatality rate of 0.53 per cent, however, was 3 times as high as that for the same ages in the state as a whole. The fatality rate at all ages in 1923 was 7 times as high for the institutions as for the state.

In its prophylactic properties the use of the serum was decidedly disappointing. Among institution children at least the serum seems reliable only where given within 6 days to children who have been exposed to small doses of infection for only a short time. If given during the incubation period it will probably have a favorable influence on the mortality, but under exceptionally adverse conditions it is inadequate. In 1923 the fatality rate for children under 3 was almost twice as high for untreated children as for those given serum (74 cases with 9 deaths as against 65 cases with 4 deaths). On the whole, however, the figures for the combined years 1923 and 1924 for children under 3 are slightly in favor of the cases not treated with serum. This is probably partly due to the small number of cases under consideration and to the decidedly unfavorable circumstances in which, in 2 of the outbreaks, the serum was used.—Edward S. Godfrey, Jr. *J. Prev. Med.* 2:11-33 (Jan.), 1928.

Vital Statistics in Iowa, 1927—Provisional figures for 1927 show a slight but encouraging decrease in the death rate in Iowa. The total number of deaths was 24,237 as compared with 25,466 the year before, and 24,619 as the average for the 5-year period from 1923 to 1927 inclusive. Heart disease again heads the list of causes of death; 4,846 persons died of heart disease in 1927 as compared with 3,970 for 1926 and 3,299 as the average for the 5-year period. Cancer caused 2,646 deaths in 1927 and 2,593 in 1926.

Cerebral hemorrhage, third highest cause of death; pneumonia, fourth; nephritis, fifth; tuberculosis, sixth, and influenza, seventh, all show a commendable decrease as compared with 1926. There were only two diseases in which there was a significant increase in the death rate. These were measles, which caused 210 deaths, and poliomyelitis (infantile paralysis) which caused the death of 29.—Iowa State Dept. of Health. *Weekly Health Message,* Feb. 25, 1928, p. 2.

PUBLIC HEALTH ENGINEERING

ARTHUR P. MILLER, C.E.

GREAT LAKES DRAINAGE BASIN AGREEMENT

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AN agreement providing for interstate coöperation in handling stream pollution problems, occurring within the Great Lakes Drainage Basin, was drafted March 7, 1928, at Gary, Ind., by the State Health Commissioners, or their representatives, of Minnesota, Wisconsin, Illinois, Indiana, Michigan, and Ohio. The State Health Departments of Pennsylvania and New York were not represented at this meeting, but their executive officers had previously expressed their willingness to become parties to such an agreement.

This agreement, which is to be officially known as the "Great Lakes Drainage Basin Sanitation Agreement," follows the general lines of the interstate agreement of the Ohio River Drainage Basin which has now been in effect for four years.

The purpose of the Great Lakes compact is defined in the following resolution:

WHEREAS the Great Lakes (Superior, Michigan, Huron, St. Clair, Erie and Ontario) are used as the only available sources of public water supplies by many municipalities in Minnesota, Wisconsin, Illinois, Indiana, Michigan, Ohio, Pennsylvania and New York, and such use must of necessity increase with the future increase of population; and

WHEREAS the protection and promotion of the public health demand that the water of these lakes and their tributary streams shall be suitable to permit the production of safe, wholesome, and palatable water supplies, after reasonable purification; and

WHEREAS sewage and industrial wastes are now discharged to the said lakes and many of their tributaries to an extent affecting the safety, wholesomeness, or palatability of water supplies obtained therefrom; and future increase in the pollution of these lakes and their tributaries will occur unless suitable corrective and preventive measures are applied; and

WHEREAS the said lakes and many of their tributary streams are interstate lakes and streams common to the States of Minnesota, Wisconsin, Illinois, Indiana, Michigan, Ohio, Pennsylvania, and New York, and pollution thereof originating in one state does or may prejudicially affect public water supplies, public health, or public interest in a neighboring state or states, thus creating a problem of common interest, and requiring coöperation between the several states; therefore be it

RESOLVED that the Departments of Health of the States of Minnesota, Wisconsin, Illinois, Indiana, Michigan, Ohio, Pennsylvania and New York, represented by the executive officers of the said Departments of Health, do hereby agree to coöperate with each other and with the United States Public Health Service in carrying out a policy for the improvement of the quality of the waters of these interstate lakes and their tributary streams, wherever necessary in these states, the prevention or correction of undue pollution thereof, to the end that the said lakes and tributary streams may be maintained or rendered suitable sources of public water supplies as aforesaid.

At the Gary meeting, Dr. Wm. F. King, State Health Commissioner of Indiana, was elected chairman and Dr. I. D. Rawlings, Director of the Illinois Department of Public Health, secretary.

The resolution, as drafted at Gary, has now been submitted to the executive boards of the various state health departments for ratification.

After this action has been taken by these boards, it is expected that the state health commissioners will again meet, and among other things, authorize the formation of a board of engineers, composed of the chief engineers of the several departments of health.

This board will be charged with carrying out the spirit of the agreement which essentially is that each state health department, agrees to exercise "conscience" in dealing with the matter of stream pollution as affecting other states.

Malaria in Haiti—This brief article is a very clear picture of the high points of malaria in Haiti, and a good description of the island in relation to mosquito production. Haiti has only one efficient vector of malaria, *A. albimanus*. This anophelese is capable of transmitting all three types of malaria. The authors give their reasons for believing that malaria was imported into Haiti and is not of native origin.

The island is small, having but 10,200 square miles; less in area than the State of Maryland, yet it has all kinds of climate—from tropical on the coast to temperate in the hills. The most important plateau is a large central plain approximately 1200 square miles in area. Parts of the island are desert-like in their dryness; other portions are exceptionally wet. Late summer and winter are the malarial seasons. Albimanus breeds all over the island wherever water collects and has been found up to 2500 feet above sea level. Rainfall varies in different parts of the island from a minimum average of 21.7 inches annually (portion of the island where the runoff dries quickly, non-malarious) to 167 inches in the most malarial part. Malaria is very prevalent and severe. Splenic index in a large number of school children shows rates varying from a minimum of around 2 per cent to a maximum of 100 per cent. Many schools show rates between 20 per cent and 60 per cent.

The problem of control differs in type in the rural and urban centers. It is the authors' belief that rural districts must at present depend solely upon adequate quinine treatment of those sick. Many of the cities practice mosquito control, and it is advised that the rest of them initiate its practice.

A. albimanus quickly begins breeding in new swampy places formed by heavy rains, thus differing from our quadrimaculatus. The malaria infection very closely follows the rainfall, lagging behind about two months.

Control work at Port au Prince is described in a general outline. It was an extensive piece of work. Albimanus was breeding in many of the street ditches, in seepage areas, and the nearby extensive swamps. For the ditch breeding and the seepage, the attack was drainage and fill. Rock drains (earth covered) were used extensively with success. Much of the swamp land was dried by complete clearing of brush and opening it up to process of evaporation. Some of the swamps were drained, and low portions were filled. Apparently the major portion of the work has now been completed, but there is yet some which remains to be done. The tables giving malaria infection by months for a number of years show a steady decline in the case rates from a January rate (1924) of 1350 per 1,000 to the January rate (1926) of only 125 per 1,000—C. S. Butler and E. Peterson. *U. S. Nav. Med. Bull.*, 25:278 (Apr.), 1927. Abstr. L. L. Williams, Jr.

An Experiment in Mosquito-Proofing Barracks of British Troops—The article covers experimental screening of certain barracks at Lahore

and Amritsar, plains stations in the Lahore Military District, India. These two stations are located in the flat country having poor drainage, and are the most malarious of all Indian stations.

Anti-larval work has been carried on for many years as has personal protection by the use of mosquito nets, mosquito lotions, fumigations, etc. Not all of the barracks at these two stations were screened. Barracks screened were long, single story, bungalow type, having a 12′ wide verandah on one side. These verandahs were pierced by a series of archways, the only openings to the verandah. A stout wooden framework was made in each archway and covered with brass wire gauze, 16 mesh, over which one-half inch rabbit netting was nailed for protection. Doorways were double screened with a 10 foot screen gangway between the doors. Doors opened outward and were fitted with double springs. Windows were screened on the outside. Fire places were temporarily filled with brick during the warm weather and all ventilators covered with wire gauze. One man per barrack room was detailed for the sole duty of keeping screens in good repair. It was made a court martial offense to prop a screen door open or to pass a door so propped without removing the obstacle.

In addition to malaria prevention, other advantages were the dispensing with mosquito nets which allowed the lowering of punkhas, the absence of flies and non-biting insects as well as pest mosquitoes and the actual lowering of the temperature in the rooms.

Malaria was as prevalent in the unscreened buildings at these two barracks in 1926 as in any other preceding year. During 1926 the malaria rate in the screened barracks in Amritsar was one-fourth the average rate for the three preceding years and at Lahore one-fifth. At Lahore the rate was less than one-third in the unscreened barracks.

The writer concludes that the screening of barracks properly carried out is a means of reducing malaria among troops, but cannot be considered as a sole antimalaria measure, its efficacy being more or less in inverse ratio to the evening attractions outside the barracks.—A. Campbell Munro. *J. Roy. Army Med. Corps,* 49:248 (Oct.),1927. Abstr. R. E. Tarbett.

The Aluminate-Alum Coagulation of Water—Alum has been used almost universally as a coagulant in water purification, but its use with certain waters, or under certain conditions has not been satisfactory. In some waters in the Great Lakes region, 0.2 to 0.4 gr. per gallon is an efficient dose, but some plants in other sections require as much as 5 or 6 gr. per gallon. Studies of these phenomena have shown that colloidal waters do not yield readily to treatment by alum. The application of hydrogen ion control resulted in great advances, but the principles of colloid chemistry, it is felt, will yield still further advances.

Many workers have sought a coagulant that would meet the conditions required by their water supply, and also yield an effluent of sufficient alkalinity to be non-corrosive. Sodium aluminate therefore came into use, but was not entirely satisfactory, until a certain type of the chemical, posessing in itself colloidal properties, was used. Further research is now going on. An account of the results at several plants is given.—C. H. Christman. *Bulletin 18-A*, issued by Chicago Chem. Co. Abstr. W. A. Hardenbergh.

Disposal of Drainage from Coal Mines—Coal mine drainage waters contain sulphuric acid in such quantities that the alkalinity of 80 to 100 gallons of fresh water is necessary to neutralize the acidity of 1 gallon of waste. Coal is produced in 28 states at a rate of 550,000,000 tons annually, and the

industry employs 850,000 men. The pollution is most acute in West Virginia, Pennsylvania and Ohio. Many water supplies in Pennsylvania have been abandoned due to mine drainage pollution. The Sanderson case dating back to 1886 is summarized. In this case the courts held that trifling inconvenience to individual riparian owners must give way to a leading industrial interest of the state.

The Indian Creek pollution suit is also summarized. In this case, a water company serving 75,000 people and the Pennsylvania Railroad obtained an injunction, which was sustained by the U. S. Supreme Court, prohibiting the discharge of mine drainage into Indian Creek above the diversion of its waters, on the ground of public nuisance being created. In this case a public use of the water was shown and no other supply was available.

The character and composition of various mine drainage waters are given and analyses are shown in tables. The occurrence of water in mines is described. Methods of treatment and costs are given. The cost to neutralize (but not redeem) streams in Pennsylvania alone is estimated at $75,000,000 for plants and $41,062,500 to $68,437,500 annually for operation.

The author suggests that any solution must be economically sound and commends the policy of the Pennsylvania Department of Health which is to protect all unpolluted streams; to stop further pollution of all streams that can be restored; and to use those now destroyed for carrying sewage, industrial wastes and mine drainage.—Andrew B. Crichton. *Water Works*, 66:30 (Jan.), 1927. Abstr. E. A. Reinke.

The Treatment of Sewage by Activated Sludge—The author, after a survey of the literature, concludes that the activated sludge process is of bacterial origin. The quantity of activated sludge must be proportioned to the consumption of the organic matter of the liquid, to the nature of these, to aeration, to the condition of the sludge, and to temperature.

It is necessary to aerate sufficiently to maintain the best bacterial flora, and to proportion the aeration to the activity of the bacteria, to the quantity of organic material to be acted upon and to the quantity of sludge in order not to pass the moment when the sludge itself is altered and commences to putrefy. The sludge should be settled well and should retain but little of the suspended solids.—Annales d'Hygiene Publique, Industrielle et Sociale, T. IV, n° 12, Decembre 1926. p. 732. Abstr. R. C. Beckett.

Use of Hypochlorites as a Sterilizing Agent for Dairy Utensils—Since disinfectants containing hypochlorites have been used for the sterilization of dairy utensils, and it has been claimed that such disinfectants are more effective than steam sterilization, this question was studied in the interests of the milk industry. Three proprietary disinfectants were studied. These contained "available chlorine" as follows: A—1.22 per cent; B—1.06 per cent; C—0.45 per cent.

Four series of experiments were conducted upon milk churns of 10 and 17 gallons capacity and the influence of different methods of treatment of the churns upon the keeping qualities of milk and upon the bacteriological condition of the churns studied. The technic used in performing the experiments is given and the results are tabulated in the form of protocols.

The authors give their conclusions as follows: (1) The amount of "available chlorine" contained in these disinfectants varied from 1.23 per cent in disinfectant A to 0.49 per cent in disinfectant C; (2) a 6 per cent solution of disinfectant A failed to give the same

degree of sterility in a churn as can be obtained by steam under working conditions; (3) the use of a chlorine preparation as a means of sterilizing churns necessitates the subsequent washing out of the churns with water if the chlorine is to be removed before milk is added. This process introduces the danger of recontamination of the churn; (4) if the churn be not washed out after treatment with a chlorine preparation, there is grave danger that chlorine will be added to the milk. That this danger is not altogether hypothetical would appear to be the case since in the United States where this method of sterilization is more extensively used than in this country, the Department of Agriculture has issued a bulletin describing a method for the detection of hypochlorites and chloramines in milk and cream. (U. S. Department of Agriculture *Bulletin No. 1114,* Aug., 1922).—W. A. Hoy and Janet R. L. Rennie. *J. Hyg.* 26:127 (July), 1927. Abstr. P. R. Carter.

Sewage Farm Covers 13,602 Acres—An abstract of an article in *The Engineer* (London) November 12, 1926, p. 519, describes the method of sewage disposal of Melbourne metropolitan area (Victoria, Australia). The land was "originally treeless, almost stoneless, open plain country somewhat clayey and poorly grassed," having an average annual rainfall of 18.14 inches.

The farm is sown with lucerne, pasture grasses and clover and flooded with sewage and used for raising hay and for grazing. Except in winter or very wet weather, the farm takes 3 inches of sewage every 2 or 3 weeks or 5½ feet per year; 8,084 acres being under irrigation. Dairying is not permitted, but grazing and raising cattle and sheep are carried on. On June 30, 1925, there were 6,671 cattle, 4,947 sheep, and 800 horses with 200 employes on the farm. Revenue from grazing usually is greater than cost of sewage treatment aside from capital charges, while in years of drought revenue meets all charges.—*Eng. News-Rec.*, 99:669 (Oct. 27), 1927. Abstr. A. S. Bedell.

Preliminary Report on a Rat and Flea Survey of the City of San Juan, Porto Rico—While rat extermination has been practiced at San Juan following two epidemics of plague, no real study of fleas infesting the rats was made until recently when such a project was undertaken in coöperation with the U. S. Public Health Service.

The town was divided into four zones: (1) docks; (2) water front adjacent to docks; (3) commercial districts not on water front; (4) remaining portions. Traps were set daily in each zone and all live rats were taken to the laboratory for examination. Classification and counts of rats and the infesting fleas were made.

Concentration of the species of rats was higher along the water front and from data already collected it appears that the species "mus rattus" was the favorite host for fleas. The per cent of rats infested with fleas when plotted graphically follows very closely the corresponding curves for temperature and relative humidity, suggesting a relationship.—Arturo L. Carrion. *Porto Rico Rev. Pub. Health and Trop. Med.* 3:131 (Oct.), 1927. Abstr. D. W. Evans.

INDUSTRIAL HYGIENE

EMERY R. HAYHURST, M.D., AND LEONARD GREENBURG, PH. D.

Budapest Congress Progress Report—The Fifth International Medical Congress for Industrial Accidents and Occupational Diseases is definitely announced to be held in Budapest, Hungary, September 2-8, 1928. National committees have been formed in the principal countries.

Since the first American announcement of December 1, 1927, Dr. Fred H. Albee, New York, and Dr. Emery R. Hayhurst, Ohio State University, Columbus, both members of the Permanent International Committee, have been appointed Joint Chairmen of the National Committee for the United States, and have appointed Dr. Richard Kovacs, New York, as Secretary.

The Travel Study Club of American Physicians, of which Dr. Fred H. Albee is President and Dr. Richard Kovacs, Secretary, has rearranged its summer trip for 1928 especially to focus upon the Budapest Congress. Those who have already indicated their intention of attending the Congress and others are invited to join the Travel Study Club either for the entire trip or at any point.

The itinerary thus far arranged calls for sailing from New York on the S.S. Munchen, of the North German Lloyd, on August 16; three days in Berlin, two days in Carlsbad, five days in Budapest, two days in Vienna, two days in Bad Reichenhall and Salzburg, and two days in Munich; then via Milan to Nice for two days and from September 17 to 27 in Spain; sailing from Gibralter on September 28 on the S.S. Conte Grande, of the Italian Mediterranean Service, due back in New York on October 5.

Correspondence regarding the trip should be had with Dr Richard Kovacs, 223 E. 68th St., New York, N. Y.

National Delegates to Budapest Congress—Certificates of delegation have been issued over the signature of Frank B. Kellogg, U. S. Department of State, to represent the United States at the Fifth International Medical Congress of Industrial Accidents and Occupational Diseases, to be held at Budapest, Hungary, to the following persons: Dr. Fred H. Albee, New York, N. Y.; Dr. Francis Dennis Donoghue, Boston, Mass.; Dr. Emery R. Hayhurst, Columbus, O.; Dr. Francis D. Patterson, Philadelphia, Pa.; Passed Assist. Surgeon O. M. Spencer, U. S. Public Health Service.

Fourth International Conference of the Permanent Committee on Occupational Diseases—According to a circular received February 15, 1928, this Conference is to be held at Lyon, France, April 3-6, 1929. The Organization Committee consists of: Dr. Agasse-La Font, Dr. Kohn-Abrest (Paris), and Professeur Etienne Martin (Lyon). The officers of the Conference are: President, Professeur Etienne Martin; Secretaire, Dr. Mazel; and Tresorerie, Imprimerie A. Rey.

The particular items for discussion will be: silicosis, including etiology, symptoms, and legislation (Professor E. L. Collis of Cardiff, will be one of the respondents); pneumonoconiosis, author yet unnamed; cataract of occupational origin, particularly with reference to etiology and symptoms (Professor Rollet of Lyon will be one

of the respondents); and the endocrine system in relation to intoxications (Professor L. Ferrannini of Cagliari will be one of the respondents). Names of others who would like to read papers upon the above listed subjects should be sent either to the Secretary Dr. Mazel 54, Avenue de Noailles, Lyon, or to one of the members of the Permanent Committee in the United States, viz., Dr. Alice Hamilton, School of Public Health, Harvard University, Boston, Mass., Dr. Cecil K. Drinker, same address, or Dr. Emery R. Hayhurst, College of Medicine, Ohio State University, Columbus, O.

Circulars of information are to appear from time to time and all interested will get in touch with either Dr. Mazel or one of the members of the American Committee.

Infective Jaundice Among Scotch Coal Miners—The British Medical Research Council recently reported 17 cases with 5 deaths of infective jaundice among Scotch miners since 1923, and in all Scotland they report 31 cases with 8 deaths, giving a mortality of 25 per cent.

These cases occurred in mines that were wet and infested with rats. Similar cases have occurred in all parts of the world and especially during the late war among soldiers in the trenches. The spirochetal origin was demonstrated in Japan in 1915. In 1916, an anti-spirochetal serum was developed which was and is quite effective in treating this disease.

Examination of rats in the infested areas showed 36 per cent infected. At autopsy, 6 cases presented an intense yellow color, effusive hemorrhages, and kidney degeneration. The liver showed degeneration to a lesser degree.

Experimental infection of guinea pigs leads to the belief that infection occurred through the skin and contaminated hands rather than through ingestion. Eliminative measures suggested are immunization, lime nitrogen on the soil, extermination of rats and drainage of mines. — *Mon. Labor Rev.*, 26:54 (Mar.) 1928.

Asthma Caused by Castor Beans—This report, by Karl D. Figley, M.D., and Robert H. Elrod, M.D., is in January 14 issue of the *Journal of the American Medical Association*. The existence of an "asthma colony" in a certain section of the city of Toledo, O., has been known to physicians for some years. A mill in the vicinity manufacturing both linseed and castor oil, while suspected, had not previously been shown to have any relationship.

The castor bean cake after the oil has been extracted is ground and used as fertilizer. In the process of grinding very fine dust is given off which is carried out through pipes in the roof. The flaxseed, after the extraction of the oil, was still found to contain about 9 per cent of oil and was too heavy for the wind to carry far.

While the odor of linseed oil was quite marked, sensitization tests for castor bean dust and flaxseed dust showed that all those examined reacted to castor bean, and only five to flaxseed, and these in a lesser degree.

In view of the fact that the cause seems so well established, the mill was ordered to take steps to prevent the dissemination of the dust.—*Month. Labor Rev.*, 26:52 (Mar.), 1928.

Quantitative Measurements of the Inhalation, Retention, and Exhalation of Dusts and Fumes by Man: I. Concentrations of 50 to 450 mg. per cubic meter—The purpose of this study was to determine quantitatively the retention of certain representative dusts and fumes by the lungs of persons forced to respire them.

Zinc oxide of a particle size of 0.4 microns, Kadox, which is zinc oxide

having a particle size of 0.15 microns, and marble dust, having a particle size of 0.3 to 6.0 microns were utilized as the representative dusts. These dusts respectively were set up in a 1,600 cu. ft. gas cabinet. The subjects were seated outside of the cabinet and derived their supply of air containing the dust from the cabinet. The quantity of dust which was exhaled was determined by means of an electric precipitator, while the volume of air was found by the use of a spirometer. Concentrations of dust from 50 to 450 mg. per cubic meter were used with exposures of from 5 to 40 minutes and with respirations from 6 to 18 per minute. Under these conditions the percentage retention for all three dusts averaged 55 with a standard deviation of 9.4. This study appears to be a very excellent and accurate piece of work.—P. Drinker, R. M. Thomson, and J. L. Finn, *J. Indust. Hyg.*, 10, 1:13-25 (Jan.), 1928.

L. G.

Changes in the Blood as Reflecting Industrial Damage—The author has reviewed the literature and her own industrial experience with reference to the blood changes on exposure to benzol, toluol, xylol, naphthalene, aromatic nitro compounds, arsine, thallium, and hydrocyanic acids. She finds that a lymphocytosis with the reversal of the leucocyte formula to the lymphocytic side with repression of the neutrophils takes place with the utmost regularity regardless of the particular poison which is acting. This similarity of effect of the various compounds causes the author to look for a common site of action, and leads her to the conjecture that action on the endocrine glands may be taking place since "as a result of functional disturbances of the endocrine glands we have this reversal of the blood formula." Such a hypothesis requires the existence of other signs of endrocrine disturbances. These have been suggested by Schmidt in the case of pernicious anemia. "If one admits that a relation between endocrine glands and diseases of the blood is at least conceivable, then it becomes possible to consider damage to the endocrine glands as a means of causation of changes in the blood due to industrial conditions."—Selma Meyer, *J. Indust. Hyg.*, 10, 2:29-55 (Feb.), 1928.

L. G.

Metal Fume Fever: V. Results of the Inhalation by Animals of Zinc and Magnesium Oxide Fumes—The purpose of these experiments was to determine if it was possible to produce a characteristic reaction due to the inhalation of freshly generated zinc oxide in animals, and also to determine whether such a reaction could also be caused by magnesium oxide fume. The authors of this paper have previously shown that it was possible to produce such symptoms in man by the inhalation of zinc oxide.

Accordingly, 25 animals of different species (cats, rabbits and rats) were exposed to freshly generated zinc oxide in an atmosphere of air plus 10 per cent carbon dioxide (in order to increase the depth of respiration) for a period of from 15 minutes to 3¼ hours, and 6 cats were exposed to an atmosphere of freshly generated magnesium oxide.

These experiments disclosed the fact that in the case of zinc oxide the animals displayed a fall in body temperature of slight and fairly transient character following brief exposure, but of marked character and prolonged duration in those animals inhaling the fumes for 1 hour or more. In the case of magnesium oxide a similar but milder reaction was found to result.

The experiments also showed that the amount of zinc inhaled is proportionately much greater during the first part of the exposure and appears to fall off in rate during the later portions of

exposure; and that inhaled zinc oxide is rapidly removed from the lungs of exposed animals, the concentration in the lung decreasing and the concentration in the liver, gall bladder, bile, kidney and pancreas increasing with time. —K. R. Drinker and P. Drinker, *J. Indust. Hyg.*, 10, 2:56-70 (Feb.), 1928. L. G.

Chronic Benzol Poisoning Among Women Industrial Workers: A study of the women exposed to benzol fumes in six factories—The author studied the incidence of chronic benzol poisoning among women exposed to the inhalation of this substance in six factories in the State of New York. Complete histories and clinical studies were made on each worker. The criterion of benzol poisoning adopted by Dr. Smith was a history of exposure and a reduction of 25 per cent or more in the white blood cell count. One out of every three women exposed was found to be chronically poisoned by benzol. The susceptibility appeared to be equal among the older and younger workers. There also appears to be a tendency toward a slight increase in the number of basophils as well as an increase in endotheliocytes and the presence of myelocytes.—A. R. Smith, *J. Indust. Hyg.*, 10, 3:73-93 (Mar.), 1928. L. G.

Efficient Exhaust Systems for Lead Melting Pots in Electrotyping Plants—Sheet metal hoods generally in use for lead melting pots are not so efficient as desired, as they do not afford complete protection for workers standing constantly over the pot, since the fumes must pass the face of the worker in getting to the hood. Lateral suction is recommended in these cases. The apparatus consists of a plate and hood at one end of the pot, the same width as the pot, leading to a pipe and exhaust fan above. The size of the equipment depends upon the size of the pot. This arrangement is much more effective than the old. (Diagram accompanies article.) —John F. Grant, Inspector, *Ind. Hyg. Bul.* N. Y. State Dept of Labor, Dec., 1927.

Apparatus for Artificial Respiration: The Barospirator of Professor T. Thunberg—Probably one of the oldest methods for resuscitation is that of mouth to mouth insufflation. Then followed the mechanical method of blowing air into the lungs and sucking it out for expiration. The manual methods of Silvester and Schafer utilize no apparatus, but simply pressure on certain portions of the body in an effort to perform air exchange in the lungs. The Henderson-Haldane apparatus attempts to stimulate respiration by the stimulatory effect of carbon dioxide on the respiratory center.

The barospirator of Dr. Thunberg consists of an air tight apparatus in which the patient is placed, connected to a large cylinder in which, by the movements of a piston, the pressure is alternately increased and decreased. By this means pressure changes are caused to take place in the lungs, thereby stimulating normal respiration. "The situation is different from that presented by other methods of artificial respiration in that ventilation is attained without volume changes in the pulmonary air spaces."

The majority of persons placed in the barospirator soon lose respiratory movements as the setting of the instrument reaches the proper point. There are no subjective symptoms other than those noticed from the ears. The author concludes that this system offers no danger to the patient, and that an instrument of this type with its undoubtedly high efficiency is bound to find hospital use in due time.—Cecil K. Drinker, *J. Indust. Hyg.* X, 1:7 (Jan.), 1928. L. G.

FOOD, DRUGS AND NUTRITION

WALTER S. FRISBIE

On the **Existence of Two Active Factors in the Vitamin B Complex** II—Literature is quoted to show that vitamin B is of complex nature containing at least two active substances, one which prevents the onset of experimental beriberi but is not capable of inducing growth when it is the sole addition to a vitamin B-free diet; the other is impotent as a beriberi prophylactic and is also in itself inactive as a growth accelerator but is an essential accessory of the beriberi preventing factor in supporting growth. The former is identical or associated with the pellagra preventing (P-P) substance of Goldberger. The beriberi preventing substance is termed B-P. Both factors were adsorbed by fullers' earth, B-P under certain conditions more than P-P. A combination of treatments with small amounts of fullers' earth, of fractionation with alcohol and of heating, furnished a preparation from an extract of velvet bean leaves, that retained marked properties of preventing pellagra-like symptoms and also of accelerating growth when fortified with sufficient B-P. The treated preparation alone did not produce any growth and did not prolong the life of rats beyond the average on the basal diet alone. A relation between the amount of B-P factor available and the rate of growth was found to exist. The concentration of the B-P factor in a sample of dried kudzu leaves was too low to permit of a complete utilization of the P-P factor.—W. D. Salmon, N. B. Guerrant, and I. M. Hays, *J. Biol. Chem.* 76:487 (Jan.), 1928.

A Study **of the Nitrogen Minimum.** The Effect of Sixty-three Days of a Protein-free Diet on the Nitrogen Partition Products in the Urine and on the Heat Production—The constant protein intake of a normal man was made so small as to be negligible by a protein-free diet and when the urinary N excretion was reduced to the so-called N minimum thyroxin (7 mg. intravenous) was administered. The diet was largely sugar (usually sucrose) and cornstarch (1800 calories) with sources of vitamins, roughage (lettuce) and mineral salts. The minimal excretion of total N during a 30-day period before thyroxin administration was 2.10 gm. in 24 hours. In a second 11-day period on this diet following thyroxin the N excretion was lowered to 1.79 and 1.75 gm. on the last two days. The value 1.75 gm. represents 0.0241 gm. per kilo. No noticeable deleterious effect followed the loss in the urine of 259 gm. of deposit protein N which totaled probably 291 gm. of N if amount probably lost in feces be added. The quantity of reserve or deposit protein is much larger than generally believed. The excretion of small quantities of N is not necessarily indicative of a great reduction in the quantity of deposit protein at least in the sense that the body cannot continue to maintain itself for a further period on a N-free diet. The output of creatinine and uric acid as well as neutral sulphur and ethereal sulfate remained extremely constant. The fluctuation in total N was almost entirely due to variations in the amount of urine excreted. The true endogenous metabolism in case of a normal adult man is slightly less than 1 gm. daily. There was a rapid fall in the basal metabolic rate during the first eight days of protein-free diet which occurred coincident with the rapid decrease in the free utilization

of the deposit protein. It remained practically constant when N excretion fell to lower levels and was definitely elevated above normal when the subject was on a high protein diet replenishing his stores of deposit protein. No noticeable physiologic disturbances resulted from the prolonged ingestion of protein-free food other than nausea due to monotony of the food toward the end.—Harry J. Deuel, Jr., Irene Sandiford, Kathleen Sandiford, and Walter M. Boothby, *J. Biol. Chem.* 76:391 (Jan.), 1928.

The Effect of Thyroxin on the Respiratory and Nitrogen Metabolism of a Normal Subject Following Prolonged Nitrogen-free Diet—A reduction of the deposit protein equivalent to 149 gm. of nitrogen by a preliminary period of 30 days on a non-protein diet did not in any way alter the characteristic effect of thyroxin on the nitrogenous or respiratory metabolism.—Harry J. Deuel, Jr., Irene Sandiford, Kathleen Sandiford, and Walter M. Boothby, *J. Biol. Chem.* 76:407 (Jan.), 1928.

Yellow Cocci in Dairy Products Which Survive Pasteurization—In investigations of various dairy products it was observed that yellow colonies of cocci were frequently encountered. These colonies seemed especially numerous on plates from pasteurized products. In the studies of these organisms the resistance to heat, the variations that occur and the general action on milk were given the most attention. Experimental data show that these organisms can resist the usual pasteurization exposures and that the same general resistance to heat was encountered in different materials. Based on cultural studies the authors have suggested a division of these bacteria into three types—A, B and C. A consideration of the various classifications studied suggests that Type A should be considered *Sarcina lutea*, Type B as *M. varians*, and Type C as *M. luteus*. The authors further conclude that these organisms were less resistant in milk containing acid sufficient to cause coagulation than in normal milk. They produce changes in milk only slowly and accordingly are probably of little practical importance in the deterioration of dairy products.—B. W. Hammer and G. Malcolm Trout, *J. Dairy Sci.* 11:18 (Jan.), 1928.

Experimental Bone Marrow Reactions. IV. The Influence of Liver and Meat Diets on the Bone Marrow and the Regeneration of Red Blood Cells and Hemoglobin—An experiment was conducted to determine the effect of liver and meat feeding on the blood regeneration of pigeons which were made anemic by starvation. The pigeons were starved from 7 to 13 days after which they were fed: (1) mixed grain diet obtained in the market and used as stock pigeon feed; (2) broiled beef liver, medium done to rare, cut in small pieces by hand to avoid loss of juices; (3) broiled beef muscle treated as liver. The weight of pigeons fed on the grain diet was regained in from 11 to 24 days while beef liver caused a rapid regeneration of red blood cells and hemoglobin up to the 12th day when they began to steadily decline. Beef meat was as effective and in many instances more effective than the grain diet. It was found that mixed grain diet and beef muscle showed essentially the same features with regard to replacement of weight and regeneration of red blood cells and hemoglobin. The bone marrow showed an abundance of erythrocyte formation and a great many megaloblasts. The bone marrows of the liver fed animals up to the 12th day were practically the same as those of the grain and meat fed pigeons. The cholesterol in the serum of the liver fed birds was increased to five times its normal value. The hypothesis is considered that the suppression of red blood

cell and hemoglobin formation is due to the excess of some inhibitory substance in the liver and not to a lack of substances, and it is suggested that the factor of inhibition or suppression of blood formation may be the beneficial factor in the liver diet treatment in pernicious anemia.—Gulli Lindh Muller, *Am. J. Physiol.* 82:269 (Oct.), 1927.

The Effect of Variations in the Proportions of Calcium, Magnesium and Phosphorus Contained in the Diet—It was deemed of considerable importance to determine whether variations in the intake of mineral salts are capable of disturbing the physiological balance among the mineral ions in the tissues to such an extent as to affect the normal functioning of the animal body. Experiments dealt primarily with the effect on rats of variation in the proportions of Ca, Mg and P contained in rations intended to be reasonably adequate in other respects. The general trend of the results obtained leaves no doubt concerning the correctness of the belief that a more or less balanced condition of Ca, Mg and P salts of the ration is essential to normal growth and functioning. High Mg as a disturbing factor in nutrition is definitely indicated by the data on growth and mineral balance, the extent of this disturbance being conditioned by the intake of Ca, P, and vitamins (or their carriers). The response of various groups of animals to certain vitamin levels points to even more important vitamin-mineral interrelationships than have heretofore been recognized.—J. R. Haag and L. S. Palmer, *J. Biol. Chem.* 76:367 (Jan.), 1928.

Vitamin Synthesis in Plants as Affected by Light Source—Biological studies were conducted for vitamins A, B and C in seeds of wheat and yellow milo maize germinated in the dark, in sunlight, and under glass of various colors, as well as under the mazda, arc, and ultra-violet lamps. The amounts of vitamin A found in seedlings seems to be a factor depending upon the light rather than upon changes taking place in the process of germination. Some increase is always found in etiolated seedlings. The quantity of vitamin A synthesized is dependent upon the intensity of illumination, length of exposure, and evidently the relative amount of shorter wave-lengths, and follows closely the rate of growth of the plant. Vitamin B is evidently not increased in the germination and early growth of the seedlings, its formation coming at a later period of development of the plant. Vitamin C is formed more rapidly than either of the other vitamins studied. There is evidence that germination alone even in the dark, produces a considerable amount of vitamin C. It increases in light-grown seedlings to an extent that is greater than can be accounted for on the basis of the increased growth of the seedlings, and its production is evidently accelerated like vitamin A, by increased intensity of light. Evidence is furnished that plants grown in the open sunlight under intense illumination should be slightly superior sources of vitamin.—V. G. Heller, *J. Biol. Chem.* 76:499 (Jan.), 1928.

Growth Upon Diets Practically Devoid of Arginine With Some Observations Upon the Relation of Glutamic and Aspartic Acids to Nutrition—The relation of arginine to maintenance and growth has been the subject of several investigations none of which has yielded convincing results. The chemical similarity of ornithine and glutamine, the latter probably being the form in which glutamic acid occurs in proteins, is very striking and suggestive. If the animal organism possesses the ability to reduce the acid amide group of glutamine to the methylene amine group of ornithine, a synthetic origin

of arginine might be readily accounted for. White rats were fed three diets; two contained hydrolyzed casein, were practically devoid of arginine, and low in glutamic, hydroxyglutamic and aspartic acids and in the third the nitrogenous element consisted of hydrolyzed casein, containing the three dibasic acids, but had been treated for the removal of arginine. The results point strongly to the conclusion that arginine is not an essential component of the diet. This conclusion is largely possible because of the fact that arginine is probably removed completely as a salt of flavianic acid (2, 4-dinitro-1-naphthol-7-sulfonic acid). The sodium salt of flavianic acid is the coal-tar dye "Naphthol Yellow S." No definite conclusions are drawn on the importance of glutamic and aspartic acids.

Rapid growth can be secured upon diets not only practically devoid of arginine but also low in glutamic and aspartic acids. It is evident that the dibasic amino acids if they are necessary dietary components, the amounts required for growth are very small as compared with the quantities ordinarily present in a casein ration.—W. Edward Bunney with William C. Rose, *J. Biol. Chem.* 76:521 (Jan.), 1928.

Typhoid Fever Epidemic, Santa Ana, Calif.—Following a severe rainstorm December 27, 1923, there occurred an outbreak of a gastrointestinal malady in epidemic proportions. The onset was severe and acute. Out of a population of 27,000, approximately 10,000 were affected, disrupting the activities of the entire city. Many of the attacks were of short duration, lasting one or two days, while the others were more prolonged, ultimately terminating in typhoid fever. The laboratory findings during the first week of the epidemic indicated that the gastrointestinal disturbance in the cases examined were due to bacillary dysentery, a few paratyphoid cases, and many cases of nonspecific gastroenteritis infection. Suspicion was directed to the water supply, but it was not until one month later that final proof of the contamination of the drinking water was obtained. The results following failure to comply with recommendations to chlorinate the water supply and pasteurize the milk supply are quite obvious. In the period between January and April 1924, inclusive, there occurred 620 cases of typhoid fever, 226 of which were due to water supply pollution on December 27, 1923, and 143 to a second pollution on February 7, 1923. During the first week in March following the second pollution of the water supply, an outbreak of typhoid occurred in the city of Orange, five miles distant from Santa Ana, which was subsequently traced to consumption of milk supplied from a Santa Ana dairy. Two hundred cases resulted from the milk—43 in or near Orange, and 157 in Santa Ana—while 51 cases were due to contact. The milk was probably contaminated by a person infected with the polluted water. There was a total of 48 deaths—case fatality rate of 7.7; 28 deaths were among the water-infected patients, 17 among the milk-infected, 3 among contacts. Of 548 cases examined for release, 29 (5.29 per cent) continued to eliminate *B. typhosus* for more than one month. Nine of these were later released on two negative stool specimens. The remaining 20 (3.65 per cent) were carriers for more than 3 months; 11 continued to eliminate typhoid bacilli for more than 6 months. Persons of the age group 45-54 continued to eliminate typhoid bacilli for a longer period than any other age group. Of 916 food-handlers examined, 17 (1.85 per cent) were found to be carriers, 5 of whom gave a history of previous typhoid. One incubation carrier was found.—Charles H. Halliday and M. Dorothy Beck, *J. Prev. Med.* 2:49 (Jan.), 1928.

The Content of Vitamins A and C in Watercress—In determining vitamin A in watercress, rats weighing 45-55 gm. were given a vitamin D-free basal diet, consisting of caseinogen "vitamin free," rice starch, hardened bean seed oil, yeast extract, lemon juice and salt mixture. One litter of 6 rats, weighing 44-49 gm. were given a basal diet containing an ample supply of vitamin D. It was found that watercress is a remarkably rich source of vitamin A, 0.1 gm. only being necessary to promote normal growth. Its growth-promoting properties were found to be stronger in the spring and summer than in the winter. It was also found to contain small amounts of vitamin D. In determining vitamin C, guinea pigs, weighing 200-220 gm., were given a basal diet of ground oats, skimmed milk powder, butterfat and sodium chloride and in addition measured amounts of watercress shoots fresh daily. It was found that watercress is a very rich source of vitamin C, 1 gm. daily being enough to protect the animals for a period of 70 days. —Katharine H. Coward and P. Eggleton, *Lancet*, 1:97 (Jan. 14), 1928.

The Relative Content of the Fat-Soluble Vitamins A and D in a Series of Cod Liver Oils—In examining a series of cod liver oils in preparation of a report on the comparison between colorimetric and biological method in determining vitamin A, the oils were studied for their content of vitamin D to see whether any relationship existed between this and vitamin A present, in any one oil. Vitamin A was determined biologically on young rats. It is concluded that so great a variation in the individual rats precludes the determination of vitamin A with reasonable accuracy unless an inordinate number of rats are used. Tables are given in which the oils are graded according to the growth increments on 6 and 19 mg. daily doses. Vitamin D was determined by three methods: (1) By increase in bone calcification after small doses for young rats on special diets; (2) by the determination of the lowered ash content in the bones of animals on a special diet "F" described; (3) by the increase in body weight. In spite of the difficulties in making accurate comparisons in biological methods, the authors conclude that the content of vitamin A in cod liver oil bears no relationship to that of vitamin D which is explained by the fact that A is less stable than D and more likely to be affected by heat and oxidation. It is pointed out that the medicinal value of cod liver oil depends more upon the antirachitic value than the content of vitamin A and since these vitamins bear no relationship, the biological method of testing cod liver oil outlined in the U. S. Pharmacopoeia is criticised.—Joan Leigh Clare and Katharine Marjorie Soames, *Lancet*, 1:150 (Jan. 21), 1928.

Is the Antirachitic Vitamin of Cod Liver Oil an Irradiated Ergosterol?—In a brief note the author reports that fractional extraction of the unsaponifiable matter of cod liver oil with alcohol at varying H-ion concentrations yields products of different properties. The extracts at from pH 3 to 5 are pale yellow in color, while with increasing pH the color darkens. The acid extracts give a spectrum identical with that of irradiated ergosterol and are more strongly antirachitic than the alkaline extracts. Other similar properties are noted from which it is inferred that the vitamin is contained in the acid fraction of the unsaponifiable matter.—A. Adam, *Klin. Wchnschr.* 6, 27:1289, 1927. Abstr., *Exper. Sta. Rec.*, 58:90 (Jan.), 1928.

CHILD HYGIENE

MERRILL E. CHAMPION, M.D.

Maternal Mortality in Canada—Report of an Enquiry made by the Division of Child Welfare, Department of Health, Canada, at the request of the First Conference on Medical Services in Canada, held in Ottawa, December, 1924. *Publication No. 37*, Department of Health, Ottawa, 1928. 72 pp.

The information upon which this report is based was collected by means of questionnaires sent to physicians in the Provinces of Canada who signed death certificates of women in the year ended June 30, 1926. These questionnaires were sent in all cases where the recorded cause of death did not clearly eliminate conditions related to childbirth. A large proportion of the physicians concerned responded to the questionnaires, and these replies and the added comments are analyzed in the report, with quotations from many letters. The total number of deaths from causes connected with childbirth was found to be 1,532, a rate of 6.4 per 1,000 live births. The age of the mothers ranged from 15 to 48, the average age being 31. They left 5,073 motherless children, 768 of whom were newborn. In the letters from physicians and others who replied to the questionnaires lack of prenatal care was mentioned more often than any other one factor contributing to these deaths.

The report calls attention to the fact that there is no reason to believe that the number of maternal deaths in the year studied was any greater than in any other recent year, or than it will be in 1928 unless something is done to improve conditions. As remedies the report urges a greater appreciation of the seriousness of this matter on the part of both physicians and the general public, to be brought about by knowledge of the facts and an intelligent and determined effort to reduce the risks of maternity.

The Canadian Division of Child Welfare has issued two new "Little Blue Books" based on this report: *Publication No. 38, Mother—A Little Book for Women*, and *Publication No. 39, Mother—A Little Book for Men*. They explain in simple language the findings of the study and emphasize the importance of prenatal care and of proper care during and after childbirth.—

Child Welfare News Summary, Children's Bureau, U. S. Department of Labor, Washington, D. C., Apr. 7, 1928.

Diphtheria Deaths in Massachusetts—The authors comment on the fact that the former gradual drop in the fatality rate of diphtheria has not been apparent in recent years, but that there has been a spectacular drop in the incidence in the past few years. The relative incidence in the school group (6-14) has been decreasing, suggesting that the use of toxin-antitoxin in school clinics is playing an important part in the decrease of the disease.

None of the cases had ever been actively immunized against diphtheria. This is a strong point of immunization.

Two-thirds of the deaths occurred among those of "poor" economic circumstances; 5.5 per cent of the cases had no physician during their illness. The source of infection was known in 19.2 per cent of the cases.

In the "good" economic group, half of the cases had been seen 2 days after the onset, in the "fair" group, half of the cases had been seen 2⅓ days after the onset, and in the "poor" group, it was over 4 days after the onset before half of the cases had medical attention.

Medical consultation was had in 29 instances.

The foregoing figures indicate very strikingly one of the chief reasons for the continued mortality from this disease. While the too general delay in calling a physician for all manner of illness is well known and regrettable, it is, of course, especially disastrous in the case of diph-

theria where each day's delay in the administration of antitoxin may mean a preventable death. The fact that 68 per cent of the deaths were classed as among the "poor," further indicates the probable complicating factors of economic condition and ignorance.

In only 5 per cent of the cases did the physician fail to make a diagnosis of diphtheria. About half of the cases were of the pharyngeal type, another third laryngeal, while less than 1 per cent were nasal only. The others were combinations of these types. The most frequent complication was of the heart.

About two-thirds of the cases were hospitalized. The average dose of toxin-antitoxin was about 40,000 units.—F. C. Forsbeck & Edward A. Lane *New England J. Med.*, Mar. 1, 1928.

The **Non-Tuberculous Child**—Non-tuberculous chest diseases require for therapy the identical three factors, rest, food and air, which are being recommended for tuberculous conditions. The present knowledge of these diseases has brought forth rest as the most effective treatment, not only in the case of the adult but also in that of the child. Food, adequate in kind and amount, with the proper eating habits is of secondary importance. A child at rest will partake of his food more heartily and willingly than one fatigued; hence, the close correlation between rest and diet. Air, which in the past has occupied the position of greatest emphasis, has now been shunted to third.

The fears of anxious mothers who suspect pulmonary tuberculosis in their children, because of certain conditions, have been found to be groundless in many cases. The disturbing symptoms reported by parents and which cause them to have the child examined are as follows: (1) underweight, with or without fatigue and listlessness; (2) persistent cough; (3) persistent low grade temperature slightly above normal; (4) fever remaining after an attack of pneumonia; (5) positive Pirquet test or roentgen ray diagnosis; (6) exposure to open tuberculosis.

Before submitting a definite diagnosis of tuberculosis, each one of these possible symptoms presented should be minutely investigated with a question as to probable causes and significance. An underweight condition does not necessarily denote a tuberculous infection nor does normal weight exclude tuberculosis. Dr. Branneman feels that the greatest coöperation must be given when a child has been exposed to the disease itself.— Joseph Branneman, M. D., *J. A. M. A.*, 90:8 (Feb. 25), 1928.

Public Health Aspects of Heart Disease—In *The Public Health Nurse*, Hart discusses the various phases of cardiac disease from the point of view of the public health worker. He feels that the layman has now become so interested in the question that he wants to know what can be done about it.

Pointing out that mortality is not the only problem in heart disease, he calls attention to the high morbidity, the magnitude of which is known only to those coming into close contact with large numbers of cases. It is not the actual loss of life that constitutes the greatest drain on the community but the number of people, young and old, who are handicapped for life by the results of heart disease. Cohn is quoted as concluding that for every person dying of heart disease, there are 100 living with defective hearts, figures which on a national basis would give approximately 2,000,000 individuals with heart disease.

The causes of heart disease are summarized under three headings: (1) general infections such as diphtheria, rheumatism, syphilis; (2) certain poisons, such as lead; (3) degenerative diseases of middle and late life. Figures seem to show that more than half the cases are the results of infection and

Hart considers this a clue to the direction our preventive measures should follow.

Discussing prevention, the writer touches on the need of effective treatment for syphilis, the need of making use of every possible bit of information regarding the prevention of rheumatic fever, and the need of general hygienic measures to postpone as long as possible the period of growing old. The value of periodic health examinations is stressed as is the importance of cardiac clinics; of convalescent homes for patients with rheumatic fever and with decompensated hearts; of vocational guidance of cardiacs; and of a program of education of the public.—T. Stuart Hart, M. D. *Public Health Nurse,* Mar., 1928.

An Analysis of Anorexia—The fact that liver has been found so efficacious in the treatment of pernicious anemia by the regeneration of blood which, in turn, is demonstrated by the return of appetite, led to a study of the effect of a liver diet on children between the ages of 1 and 14 years who were suffering with anorexia or loss of appetite. Only those children who definitely presented signs of malnutrition in addition to the loss of appetite were considered.

Cases of anorexia may be due to organic defects or purely functional causes. Among the most common organic causes were found to be septic tonsils and adenoids, acute infections, tuberculosis and pyelitis.

In the determination of the treatment of functional anorexia, found in about one-third of the group, three methods were tried: (1) daily use of saccharated iron; (2) daily use of cod liver oil; (3) addition of fresh calf's liver, broiled beefsteak and lamb's kidney to the diet three times weekly.

No comparison could be drawn between the effects of saccharated iron and cod liver oil but the results of these two were compared with the results of the liver, beefsteak and lamb's kidney feeding. Because with the addition of liver, the increase in weight was considerably greater than with the addition of cod liver oil or saccharated iron, it was concluded that liver may contain a specific stimulant to the appetite.—Walter M. Bartlett, M.D., *Am. J. Dis. Child.*, Jan., 1928.

Home Economics in High School—According to *American Child Health News,* the Manual Arts High School in Los Angeles, has tried the experiment of giving a course in home economics for boys. The latter apparently became interested in home economics for cosmetic reasons because of the general prevalence of acne. After looking into the matter of home economics they acquired a further interest in the preparation of food, and so a class was formed to teach the boys the principles of nutrition and diet. Later, cooking was added.

The final result was that a complete course was worked out for boys for the last two years of high school. An interesting result of this course from the point of view of the health educator was that the boys not only followed the proper dietary regulations themselves, but insisted on their families doing the same.—*Am. Child Health News,* Feb. 7, 1928.

PUBLIC HEALTH NURSING

MIRIAM AMES, R. N.

Baroness **Sophie Mannerheim**—Nurses throughout the United States and Europe are paying tribute to one of the greatest members of their profession. The death of Baroness Sophie Mannerheim in January of this year, brought to a close a long career of usefulness and service which exerted a widespread influence.

Baroness Mannerheim was born in Finland and educated in the Nightingale School, St. Thomas' Hospital, London, from which she was graduated in 1902. Two years later she returned to Finland to occupy, one after another, positions of importance. She was a moving force, whose wisdom in guidance affected the progress of nursing in her native land.

Her interest in other countries was manifested by her connection with the League of Red Cross Societies, her participation in the activities of the I. C. N. for many years, first as President, and later as Honorary President of the Council.

The nurses who attended the Helsingfors Conference in 1925 have an unforgettable memory of Baroness Mannerheim.

The Biennial Meets in Louisville—Will you be one of the 7000 nurses who will attend the Biennial Convention of the Three National Nursing Organizations, June 4-9, in Louisville, Ky.?

Headquarters for the convention will be in the Jefferson County Armory where the large general meetings will be held, and where a commercial exhibit of about 100 displays of interest to nurses will be conducted.

Dr. Charles Hubbard Judd, head of the School of Education at the University of Chicago, will be the speaker at the opening meeting of the convention, June 4, at the Armory, his subject being "Adult Education." Convention members will be welcomed at this time by the Governor of Kentucky and the Mayor of Louisville, who will speak; and S. Lillian Clayton, President of the American Nurses' Association, will respond for the nurses. Brief talks will be given by Miss Clayton, Carrie M. Hall, President of the National League of Nursing Education, Anne L. Hansen, President of the National Organization of Public Health Nursing, and Clara D. Noyes, director of the Nursing Service of the American Red Cross.

Municipal Nursing Session will be held June 6, from 11 to 1 o'clock under the auspices of the N. O. P. H. N. The subject will be "Appraisal of Municipal Nursing Service," (a) "Tools for Measuring Nursing Service," discussed by W. F. Walker, D. P. H. of the A. P. H. A., and (b) "Factors Determining the Scope of the Nursing Program," by Emma Winslow, Ph.D., of the Commonwealth Fund.

There will be sessions on rural, school, tuberculosis and industrial nursing; on staff education and supervision; on relationships between community chest and public health nursing organizations.

Supervised Midwifery Versus ———?—Many Americans resent the insinuation that practices in their country are inferior to those abroad. Yet the low maternal mortality in certain European countries which have supervised midwife practices at least makes us question our own maternal mortality and our attitude on the subject of midwifery.

Scandinavia is one of the countries which has a system of supervised midwifery. Schools where midwives are trained are aided by government subsidies and are parts of large maternity hospitals. Here, girls who are recruited from the classes which would furnish student nurses in this country, receive a thorough training by means of practice and precept. They are trained to realize that childbearing should be a perfectly normal function but that abnormal conditions may develop, when a doctor is necessary. Therefore, they are taught to recognize these abnormalities. In the one or two years of training, ample opportunity is given for actual assistance in childbirth, as many as 80 or more cases being attended each year by each student under supervision.

Because most of the midwives or "maternity nurses" in Sweden go into rural communities where doctors are not readily reached, these women are taught certain obstetric operations. They are also taught to give prenatal advice and information about the general hygiene of the normal child in its first year.

Each midwife makes a report of her work periodically to a central authority. Additional requirements are that she take review courses of two weeks each at certain intervals and must retire at the age of 50. The results of this careful training and supervision may be judged in part by the low maternal death rates and the morbidity following childbirth.

While the Scandinavians are a homogeneous people and their physical development favors natural labor, yet they have the same sort of complications of pregnancy as exist in our country. However, proportionately there are not so many cases of sepsis as in the United States. Does the low maternal mortality and morbidity from sepsis in Scandinavia and the high maternal mortality and morbidity from the same disease in the United States indicate the necessity for encouraging a similar system of midwifery in our country? Even in the United States, the midwife has been "credited with better results as far as sepsis is concerned than has the physician." But the haphazard way in which this practice is carried out in most parts of the United States demands a reform if this type of medical practice is to continue.

While there may be some objections to recommending supervised midwifery unreservedly in the United States, some solution of our high maternal mortality must be found by the medical profession.—George W. Kosmak, M.D., Results of Supervised Midwife Practice in Certain European Countries, *J. A. M. A.* 89, 24: 2009 (Dec. 10), 1927. B. J. B.

Scarlet Fever Review—Although we may be sure of our knowledge, an occasional review of the facts, especially when these facts are presented by an authority, is advantageous. Therefore, we are glad to have Dr. Dyer's summary of scarlet fever.

Occurrence—In the United States, scarlet fever is more prevalent in the North than in the South. It occurs during the cold months of the year, the peak being reached in December and January.

Susceptibility—Scarlet fever is primarily a disease of childhood, although it may attack persons of any age. Between 2 years and 9 years, children are most apt to catch the disease and the fatality is greatest.

Cause—Hemolytic streptococci are now regarded as being the cause of the disease. The germs are found in the throats of scarlet fever cases and their transference to the throats and nasal passages of susceptibles, either directly or indirectly, causes the disease in others. Bodily discharges are also infective. Like the diphtheria germ, scarlet fever germs not only cause a local reaction but also produce a poison which is absorbed by the body.

The Disease—There are three well established stages in scarlet fever: (1) period of infection; (2) period of eruption; (3) period of desquamation. In the first, the child becomes suddenly ill with sore throat and fever, often with vomiting. The tongue is furred and throat parched. This stage usually lasts 24 to 36 hours.

The eruption, usually appearing on the second day, may come out a few hours after the first symptom or it may wait for 48 hours. It appears first on the neck and chest and readily spreads over the entire body. This may persist for 2 or 3 days and then gradually fades, accompanied by a decrease in temperature.

The amount of peeling usually depends upon the intensity of the rash. Desquamation usually lasts from 10 to 20 days.

The severity of the symptoms depends upon the type of the disease. The tongue in scarlet fever has a characteristic appearance. At the outset, it is coated with white, the edges being red. The papillae appear as little red points. Later, the coating disappears leaving the tongue rough and red, the characteristic "raspberry tongue."

Inflammation of the throat is likewise a prominent symptom in scarlet fever.

Complications—The most common complications are inflammation of the kidneys, middle ear disease, endocarditis, adenitis, and joint affections. These may follow even apparently mild cases of scarlet fever.

Period of Communicability—Scarlet fever can be transmitted from the time of onset until the infectious agent has disappeared from the mucous membrane and from any discharges. In most uncomplicated cases, it is probably not infectious in the 4th week of an attack.

Carriers—Carriers in scarlet fever are persons with such slight cases that they are not known to have the disease, and convalescents who harbor the germs.

Prevention—The Dick test has been devised to determine susceptibility to scarlet fever. In this, a small amount of scarlet fever streptococcus toxin is injected into the skin. Susceptibility is shown by the presence of a reddened area, appearing in about 24 hours at the site of injection. Larger amounts of scarlet fever toxin may be given to susceptible persons to give them immunity (now five doses at weekly intervals are given). This method of immunization is especially useful in institutions and to protect nurses caring for scarlet fever patients.

Care of Scarlet Fever Patients—A patient should be carefully isolated. All but necessary furniture should be removed from the room where he is. Everything in contact with the patient should be cared for by itself, whether bedding, towels, eating utensils. After use, they should be kept an hour or two in disinfectant solution or boiled in soapsuds. Partially eaten food should be burned. Cloths or paper napkins, soiled with discharges from the patient, should be burned.

Precautions for the Attendant—As the hands of the attendant may become readily infected in the care of the scarlet fever patient, unnecessary handling of the patient should be avoided. When contact is necessary, the hands should be cleansed in hot soapsuds. The attendant should also protect herself by covering hair and clothing. The coverings should be disinfected before being sent out of the room.

Disinfection—This is governed by the regulations of the local board of health. Gaseous disinfectants are probably useless. More effective is thorough cleaning of the room with soap and water and the action of fresh air and sunlight.

Treatment of Contacts—If scarlet fever occurs in a family of children, it does not necessarily follow that all the children will have the disease, especially if isolation is prompt and complete. Such contacts, if possible, should be sent away to relatives or friends having no small children. There they should be carefully watched for symptoms indicating the presence of the disease. They should be kept from school during this period. Adult members of the family, taking precautions and avoiding any contact with the patient, may come and go freely, except in the case of food handlers.

Many contacts may be protected by immunization with scarlet fever toxin (after a preliminary Dick test). When the test is given, cultures from the nose and throat should be made to determine presence or absence of the hemolytic streptococcus. If the test shows susceptibility and if there are no symptoms of scarlet fever (such as, temperature or sore throat), the first immunizing dose of toxin may be given. An exposed child with positive Dick test and harboring scarlet fever germs should be watched and should not be given further injections of toxin if symptoms exist. An exposed child with positive Dick test and symptoms of scarlet fever may be given an early therapeutic dose of scarlet fever antitoxin.

Precautions—The case should be reported immediately and all quarantine regulations strictly observed. A food handler in whose household scarlet fever occurs should discontinue business while scarlet fever remains on the premises. Even then, he should stay away from work until time has shown that other members of the family have escaped infection. Milk bottles, before leaving the house, should be thoroughly disinfected, and should not come into contact with the persons caring for the patient.

Control—Teachers, school nurses, and school doctors, can do much to control the spread of scarlet fever in schools. The teacher can exclude

from classroom any child appearing ill. Immunization of susceptible persons by the scarlet fever toxin may be used where chances of exposure are greatest. (This toxin has been used too short a time to permit a statement as to how lasting such immunity is.) In cases of deaths from the disease, a public funeral should not be held.

General Precautions Against Catching the Disease—Infections are more apt to be established where there are diseased conditions in the mouth; such as, defective teeth, or diseased tonsils and adenoids. Such conditions, therefore, should be remedied. Also, children should be taught to keep things out of the mouth which do not belong in it.—

Surgeon R. E. Dyer, U.S.P.H.S, Scarlet Fever: Its Prevention and Control. *Pub. Health Rep.*, 43,2:57 (Jan. 13), 1928. B. J. B.

Public Health Nurses, Illinois—The Illinois State Department of Public Health aims to inaugurate a nursing service in every one of the 102 counties of the state. At present 31 counties are without nursing service of any kind. The department has just received an added appropriation providing for an increase of staff from 4 to 15 nurses.—Weekly Notes on Child Welfare Topics, U. S. Children's Bureau.

Public Health Nurses, California—Requirements for applicant for examination for certificate as a public health nurse. Adopted by the State Board of Health, October 6, 1923. Amended July 31, 1925. Amended February 4, 1928.

Resolved, that each applicant for examination for certificate as public health nurse shall be:

1. Registered nurse under the laws of California.

2. Shall have completed a public health nursing course of eight months in a school approved by the California State Board of Public Health, or

3. Shall present evidence of having engaged in general public health nursing for at least 2 years in connection with a public health organization approved by the California State Board of Public Health.

4. In addition to the 2 years' practical experience evidence shall be required showing that the candidate has attended a summer course of at least 6 weeks at the University of California, at Berkeley or Los Angeles, or a course of equal standard at any other university, or

5. In addition to the 2 years' practical experience exidence showing that the nurse has completed a 4 months' course in public health nursing, the outline of which has been approved by the California State Board of Public Health, will be accepted in lieu of the 6 weeks' course in public health nursing at a university.

6. All applications for examination as public health nurse shall be filed in the office of the State Department of Public Health, State Building, San Francisco, and shall be passed on by a committee of the State Board of Public Health.

7. All applications shall have attached to them an affidavit, sworn to before a notary public, as to qualifications outlined in paragraphs 2, 3, 4 and 5.

8. These regulations shall be in force and effect on and after February 4, 1928.—

State of California, *Weekly Bulletin*. VII, 2 (Feb. 18), 1928.

The Nurse's Part in Cancer Control—There is a tendency among those who have cared for patients with incurable cancer to feel that there is no hope where this disease is concerned. Yet research information tells us that one-fifth of the 5,000 persons who die each year from cancer in Massachusetts could have been saved if they had received treatment in time, instead of waiting until their condition was hopeless before securing medical advice.

If this is true for Massachusetts, it is also undoubtedly true for the rest of the United States. Has not the nurse a message of hope when she knows that there should be no skin cancers, that 70 per cent of the breast cancers could be cured if taken in time, and that rectal and also external cancers can be controlled or cured? The nurse can not only aid by urging early examination of superficial cases and prompt treatment, but she can also bear a message to those who are nursed in the home. Perhaps the best she can do for these is to de-

nounce the spending of money for quack treatment. She also can help persons to realize the dangers of the indiscriminate use of morphine which may be taken to alleviate pain.

The nurse can do much to help the cancer patient if she will courageously use the knowledge which is at hand.—Elizabeth Ross, How Can We Help in the Control of Cancer, *Pub. Health Nurse*, XX, 1:13 (Jan.), 1928.

B. J. B.

The Psychology of Keeping Young—Under the guise of this attractive title, a sound lecture in mental hygiene was given by Prof. H. Overstreet of the College of the City of New York at Ford Hall, Boston, Mass., in December.

Of course, it is understood that in a discourse of this kind the words "youth" or "senility" refer not to the physical body, nor to the mind taken as a separate entity, but to the subtle blending of the two which enters into the making of a personality.

However, for the purpose of illustration, he began with the causes of physical senility and debilitation. These were:

1. Poisons—endogenous or exogenous; that is, poisons produced within the body due to organic disorders or poisons introduced from outside, such as bacteria which start up toxic processes as soon as they find suitable conditions in the body.

2. Starvation—due to either the quantity or the quality of the food ingested. Now when we consider the causes of the aging of the "body-mind," we find these same two factors—poisons and starvation. In this case, the poisons are our emotions, those which are frustrated and are not allowed to be expressed either directly or through some other channel. We know how much we can be aided by our instincts and emotions; we are afraid of fire—therefore, we avoid it. But if we saw fire, were afraid but could not escape, our lives would be endangered. In the same way, worry, anger, sorrow and all the other emotions are undermining if they are allowed to grow to enormous dimensions with no outlet for escape.

As to starvation, senility approach is rapid if we allow ourselves to fall into a rut and give ourselves no new interests. No matter what the physical age is, anyone who keeps abreast of the existing world and develops new interests as the years go by wards off the bugaboo of old age.

After dealing with the causes and prophylaxis of senility, Prof. Overstreet gave the symptoms (a rather irregular procedure but good for the morale of the audience which might have diminished had the process been reversed). The symptoms enumerated were talkativeness or the other extreme of silence, and the practice of reminiscence!

The lecturer made one amusing suggestion. He expressed the opinion that instead of determining a person's I. Q. by an intelligence test, it would be much more valuable to give him a senility test to serve as a warning of approaching danger. That would be the only kind of examination in which the lowest rating would give the highest honor.

H. Z.

(Miss Haigouhy Zouvickian, a staff nurse of the Community Health Association of Boston, is also one of the Editors of the *Community Health News*, which made its first appearance in October, 1927. The bulletin serves to keep the staff nurses informed of interesting phases of public health nursing, and changes in personnel. It is pleasing, both for its serious and humorous content.)—*Community Health News*, Dec., 1927.

EDUCATION AND PUBLICITY

EVART G. ROUTZAHN*

The Cost of a Community Bulletin—The attractive bulletin of the Dutchess County Health Association will illustrate the cost of getting out about 425 copies of an average monthly issue of six letter size pages:

When we are able to obtain cuts free of charge (of late we have been able to borrow them from the State Committee on Tuberculosis and Public Health of the State Charities Aid Association) we have the printer print the title and cuts only, for the first and last pages. The news items we multigraph here in our office. When we are unable to secure cuts, we simply multigraph the whole thing in the office, title page and all.

We buy a year's supply of paper (20,000 sheets) at a time, thus getting it more cheaply. Following is a list of the costs:

Paper	$4.05
Printing (title and cuts)	3.40
Postage (1-½c envelopes unsealed	6.45
	13.90

In addition it takes the office secretary approximately one week to address the envelopes, multigraph the letter, assemble, clip, fold, and insert it in the envelopes. Her salary is $23.00 a week.

It takes me approximately the equivalent of one day's work to get the material in order to print.

Dorothy J. Carter, executive secretary, may be addressed at 16 Cannon St., Poughkeepsie, N. Y.

Health Poster Information—Information about health posters—present and future—is offered by the National Tuberculosis Association. The service starts with a loose-leaf binder containing posters or reproductions of posters, with descriptions and prices from 32 national organizations. Price, $25. For an additional fee of $7.50 per year, additions will be made to the collection from time to time. This service should be of much interest and value to health workers who have thought out the poster situation and have learned how to discriminate between those that are good and those not so good. It is too easy now to secure mediocre posters. May the time come when not one man or one organization will select the posters, but when a representative group will offer a service in which the posters distributed will meet reasonably high standards in conception, text, design and printing.

Statistics in a Window Display—It seems possible to use a simple statistical comparison effectively in a window display. Perhaps you wish to show the downward trend of tuberculosis through a period of years, the upward trend of cancer or heart disease, or the increased use of a health center. The usual bar diagram may be replaced by a group of large cylinders made of colored paper. Add a solid background, say of dark cloth which the store window display man will have on hand. Size of cylinders and their distance from the background will be determined by experiment in relation to the width and depth of the window. Above the cylinders will run a concise caption done in modernistic style. Experiment may show that the caption can be supplemented by reproducing the diagram on a smaller scale on a card, thus making more obvious the larger display by cylinders.

The Nurse Must Know How to Arouse Interest—"She must know how to arouse community interest in a maternity and infancy program, in bet-

* Please address questions, samples of printed matter, criticism of anything which appears herein, etc., to Evart G. Routzahn, 130 East 22d St., New York, N. Y.

ter care for mothers and babies. That goes far beyond a mere publicity campaign. It goes into the realm of knowing how to arouse and make use of the latent interest of every group in her community, and by actually tying it into her program, making it come to life and amount to something."—From Standards for Training of Public Health Nurses, by Elizabeth Fox.

That means a *real* publicity campaign—and not "a *mere* publicity campaign"! At present it is difficult for the public health nurse to obtain training along these lines.

What Pennsylvania Does—The Bureau of Public Health Education, State Department of Health

. . . prepared 52 weekly health talks which were broadcast throughout the newspapers of the Commonwealth. Items for the *American Medical Journal*, the *Atlantic Medical Journal* and other publications were regularly released, as also were facts of interest to the newspaper reading public. Moving pictures circulated by this bureau for the year 1927 reached a total of 110. *Pennsylvania's Health*, the official journal of the Department, was prepared and issued six times during the year. The journal is now forwarded to 26,000 people, and for the entire year reached 132,000 first readers of all issues published. Campaigns in which this bureau took part involved the annual clean-up week, anti-fly activity. Lancaster welfare drive and Pennsylvania farm show.

Five Steps Leading to Better Health Education—Of course our printed matter and other educational material can be improved. Five simple, though vital steps to that end were emphasized at the 1927 Public Health Conference called by the American Medical Association:

1. More general use of accepted principles, technics and forms of skill adapted to our needs. I refer especially to the technic of printing, principles of psychology, and facility in writing in every-day language.
2. Employment of persons to do the work of health education who are trained to do it, and this means that we must first offer training.
3. Revision of the methods of supervision and the working conditions under which preparation of health education material is carried on.
4. A philosophy and a program for the health education work of official and private agencies. Both of these elements are lacking in the work of many agencies.
5. Recognition of the time and thought that is necessary in producing publicity material that gets results.

"Will the Girls Be Interested?"—When the Girls Work Committee, Chicago Council of Social Agencies, started the "Girls Health Trail" project they had no idea with what enthusiasm the girls would respond.

Interest them in health habits we must, for we were desperately aware that young women living under present conditions of personal liberty and city tension were spendthrifts of health. . . . Could these independent, heedless schoolgirls or these hard working young girls in office and industry be interested in checking up their own health habits by means of a simple daily health chart? Would they submit to the physical examination which might disclose the presence of disease in time to enable them to secure the necessary attention to teeth, eyesight, etc.?

We have our answer. More than 7,000 girls have already agreed to keep the daily habit chart for three months. Our physical examination centers are overworked, even though all girls able to do so are requested to go to their private physicians.

"The Girls' Health Trail," is simply the united simultaneous effort of participating organizations to arouse civic attention to the health programs of individual agencies and to stimulate a more general interest in the health of girls.—

Social Service, Chicago, Ill. For a description of the "Trail to Health" see *Dairy Council News*, 910 South Michigan Ave., Chicago. March, 1928. *Free.*

SLIDES AND FILM SLIDES

The usefulness of the title-slide for lantern slides is emphasized in "The Sub-Title Applied to the Lantern Slide," by J. N. Emery. *Educational Screen*, 5 South Wabash Ave., Chicago, Ill., April, 1928. 25 cents. But of course the text and appearance should be comparable to the best of the screen captions. The

article tells how to utilize discarded photographic negatives, glassine wrappers from candy boxes, as well as the commercially prepared gelatin-mat-carbon combinations.

An example of the services offered by state universities is the slide material on health included in the 1927-1928 catalogue of Lantern Slides of the Extension Division, Indiana University, Bloomington, Ind. *Free.* (Outside of the state $2 a week rental is charged.)

Film slides or strip films available through the Metropolitan Life Insurance Company, 1 Madison Ave., New York, N. Y., include "No More Diphtheria," "One Scar or Many," "Working for Dear Life," and "How to Live Long" (general health).

NEW PERIODICALS

Tuberculosis Abstracts, National Tuberculosis Association, 370 Seventh Ave., New York, N. Y.: A 2-page review for physicians. *Free.*

Postage has absorbed *The Mailbag,* and will continue publication of the combined magazine at 18 East 18th St., New York, N. Y.

Medical Progress, "a journal for laymen," American Association for Medical Progress, 370 Seventh Ave., New York, N. Y. Quarterly. $1.00 a year. Sample copy *free.* "To diffuse among the lay public an understanding of research methods in medical science."

Food and Health Education, 468 Fourth Ave., New York, N. Y., has become *The Home Economist.*

Dry News is house organ of American Dry Milk Institute, 160 North La Salle St., Chicago, Ill.

FOR THE NEWSPAPER

The school nurse—Bureau of Education, Washington, D. C. News Release "P. N. 22124."

Preventive treatment for children's teeth—Bureau of Education, Washington, D. C. News release "P. N. 22125."

A series of news releases issued by U. S. Public Health Service, Washington, tell of world progress and national progress in public health. *Free.*

Again the Syracuse *Post-Standard,* in coöperation with the local Department of Health, published an Annual Spring Health Number, a 20 page tabloid magazine section of its March 18, 1928, issue. Samples *free.* Address R. W. Andrews, *Post-Standard,* Syracuse, N. Y.

Material to be worked into copy for bulletins and press releases: "Principal Causes of Illness in a Typical American City." U. S. Public Health Service. Released March 26, 1928.

The latest syndicated newspaper health column is "Health—How to Keep It," by Dr. Herman N. Bundesen. "All reader queries answered personally by mail." A recent week's series covered "Happiness—the Child's Tonic," "Is Your Child Jealous?" "Exercise for Health," "Character Building," "Overcoming Fear," "Mental Habits." Doubtless sample copies will be sent upon request to the Syndicate Department, *Chicago Daily News,* 15 North Wells St., Chicago, Ill.

"The total number of morning and evening dailies in the United States now is 1,949, compared with the previous year's 2,001. The total circulation of our evening papers now exceeds 23,000,000 copies daily; for morning papers the daily circulation exceeds 14,000,000 copies; Sunday total circulations exceed 25,000,000."—*Editor and Publisher,* Jan. 21, 1928.

STATISTICS

The Department of Commerce, Washington, D. C., will supply copies of "Estimates of Population for the United States and States for 1928." *Free.*

A few paragraphs explaining several simple features of vital statistics—in "Vital Statistics Are Interesting," by G. B. L. Arner. *Pennsylvania's Health,* Harrisburg, Pa. March-April, 1928.

BULLETINS

A good grade of envelope, in contrast with the cheaper manila envelopes, now gains a better hearing for *Campaign Notes* of American Society for the Control of Cancer.

The Canadian Red Cross, Toronto, Can., has gained in attractiveness and readability by reducing the amount of red on its pages and adopting a new typography. The contents, also, have become far more interesting and definitely helpful to its readers.

What insurance companies and insurance funds are doing to educate the public in various countries is told in "Insurance and Health Education." *World's Health,* Paris, France, Dec., 1927. 20 cents.

Detailed information about the 15 organizations comprising the National Health Council is given in a directory page of the *Monthly Digest,* 370 Seventh Ave., New York, N. Y. Copy *free.*

Several popular articles appear in the Special Milk Number of the *Northwestern Health Journal,* St. Paul, Minn. Nov., 1927. 10 cents.

Mental Hygiene Bulletin, National Committee for Mental Hygiene, 370 Seventh Ave., New York, N. Y., has been re-born in appearance and contents. Sample *free.*

NEWSPAPERS

Again *Editor and Publisher* issues its International Year Book edition with lists of dailies in many countries; city and Sunday editors named for many United States and Canada dailies; numerous classified lists; art and literary markets in the United States; books, schools, syndicates, mat and cut services, etc., 352 pages 10 by 13 inches. Jan. 28, 1928. Times Bldg., New York, N. Y. $4.00 with year's subscription.

Fair and wise policies in dealing with the newspapers in emergencies are outlined in "Helpful Relations with Local Newspapers," by F. H. Williams. *Trained Nurse.* Oct., 1927. Especially important are the detailed suggestions as to information to be supplied in writing, and the handling of telephone interviews.

MOTION PICTURES

"Just Around the Corner," is divided into three parts: Dependency, Health and Character Building. The Four Horsemen are brought into the scene of each picture in silhouette, representing Poverty, Evil, Sickness, and Death.

A great city with its tall buildings, shining lights and bridges sleeps under a seemingly calm exterior. Through the sky, riding swiftly, come the Four Horsemen, tramping down the weak, the sick, the helpless and the underprivileged.

The work of the visiting nurses, Infant Welfare Society, Occupational Therapy Department of the Junior Board and summer camps are shown under the section of Health. These agencies beat down the advance of the Horsemen who gallop through the scenes, holding the thrill of the picture.—

Otto Bradley, Community Fund, Minneapolis, Minn.

A film entitled "The Fly Majanka and her adventures" tells the story of an adventurous fly which gains entrance to a library and turns over the pages of a text-book of hygiene. She realizes the damage done by flies and calls a big meeting of flies at which she appeals to them not to settle on human food. The flies laugh at her and chase her away and she takes refuge in a doctor's house. There she turns her attention to the doctor and begs him to start a campaign. She shows him a mill-pond with larvae floating on it, leads him to the "Fly's Paradise," an insanitary rural privy, and altogether reads him a severe lesson. Majanka and her companion at length reach the farm of a peasant named Kluge, a model of cleanliness, who takes all the proper precautions against flies but complains that his efforts are of little avail since his neighbor cares not a rap. The doctor visits the careless neighbor and lectures to him about his dirty cowsheds, telling him the reason of his child's inexplicable illness from an infectious disease. Finally all the neighbors are converted and a great campaign against flies takes place. Every fly is destroyed except the adventurous Majanka, who, as befits one who has made history, is handed down to posterity in a museum!—

Reichsausschuss fur Hygienische Volksbelehrung, Luisenplatz 2-4, Berlin N. W. 6.

EDUCATIONAL MATERIAL

The revised series of pamphlets and other publications of the American Heart Association, in course of preparation, have been classified as follows: (a) those for the workers, including physicians, nurses, secretaries and others; (b) those for the patients and their families; and (c) those for the general public.

Health-Diseases, Drugs and Sanitation. List of publications relating to these subjects. Revised. Superintendent of Documents, Washington, D. C. Price List 51. *Free.* New editions mailed as issued—if requested.

Safeguarding Your Health From Tuberculosis. Department of Health, New Haven, Conn. Well done 24-page pamphlet explaining to citizens "How New Haven Cares for Tuberculosis" through public and private agencies. A form of reporting the work being done.

The 50 million dollar welfare bond issue to be voted on in Pennsylvania in November is responsible for four 6-page folders issued by the Pennsylvania Mental Hygiene Committee of the Public Charities Association, 311 South Juniper St., Philadelphia, Pa. The copy is good, and the form is a good example of the better grade of quite inexpensive folder for widespread use. Of course the type should be larger, but the leading makes it quite readable. Each of the series is on a different color of paper. The titles: "Salvaging the Feebleminded," "Handicaps of Epilepsy," "Why So Many Go Insane," "Do You Know?" Samples *free.*

A handy manual of 16 pages, *Health for the Family,* tells the residents of Bellevue-Yorkville district, New York City, of the clinics and services available. Page by page a type of clinic or service is described, with days and hours. Very well done—except that the map might better have been an inch wider to gain in clearness and usability. Address Bellevue-Yorkville Health Demonstration, 325 East 38th St., New York, N. Y. *Free.*

An educational campaign against rickets conducted by Mulberry Health Center, 256 Mott Street, New York City, produced a series of exceptionally good 1-page leaflets, an 8-page pamphlet, and four posters (one of which is not so good). A sample set for $1.50; set of leaflets, 10 cents; posters, 40 cents each. Special rates for quantities. Ask for "Plans for a Campaign Against Rickets." See reproductions in *Trained Nurse.* Jan., 1928. A brief account of the campaign in *Public Health Nurse,* March, 1928.

HONORABLE MENTION

Health, New Hampshire State Board of Health: for list of contents on cover page.

Fifth Annual Report of Quebec Provincial Bureau of Health: for a table of contents (called an index).

REQUESTS

Outline diagrams of the digestive tract are desired by Mabel Milhan, Home Demonstration Agent, Canton, N. Y. Please send your answer also to editor of this department.

Copies of posters and other material, as well as suggestions helpful in preparing a health exhibition will be appreciated by Dr. T. N. Mazumdar, Health Officer, Calcutta, India.

"On the average, what proportion of a welfare or nursing budget do you think might well be devoted to publicity purposes?"

Who has issued a folder or other publication entitled "The Cheapest Health Insurance"?

LAW AND LEGISLATION

JAMES A. TOBEY, LL. B., DR. P. H.

Sunk in committee?—The Jones Bill, S.3356, for federal health coördination has been transferred from the Senate committee on Commerce, of which Mr. Jones is chairman, to the Committee on Finance, of which Mr. Smoot is chairman. As a consequence, many observers believe that this measure will be permitted to repose peacefully there for some time.

As previously announced, the Parker Bill (H. R. 11026) passed the House early in March. When this was sent to the Senate it was referred to the Senate Committee on Commerce, of which Mr. Jones is chairman, where it is expected to receive favorable consideration. Mr. Jones at the same time introduced another bill (S. 3356) which was a counterpart of the Parker Bill. This bill was also originally referred to the Commerce Committee, but Mr. Smoot, Chairman of the Committee on Finance, somewhat belatedly discovered this and asked that Mr. Jones's bill be referred to the Finance Committee. This has been done and Mr. Smoot indicates that this bill will probably not be reported out of his committee. Since the bills are identical, favorable action on the original House bill will provide the desirable legislation for federal health correlation even if the Senate bill is killed in Mr. Smoot's committee.*

Senator Ramsdell has introduced a new bill for a National Institute of Health and this measure, S.3391, now contains none of the provisions for federal health correlation, but merely a proposal for $10,000,000 for what is virtually a vast expansion of the Hygienic Laboratory.

A Federal Cancer Study—A thorough investigation of the means and methods whereby the federal government may aid in discovering a successful and practical cure for cancer would be made by the National Academy of Sciences, according to a bill, S.3554, introduced in the Senate by Mr. Neely. A report would be made to Congress for a plan for the participation of the federal government in eradicating cancer. In order to perform this task, an appropriation of $100,000 would be authorized to reimburse the National Academy.

Anti-vivisection—A little late, but none the less offensive, the anti-vivisection bill has finally appeared in Congress as H. R. 11998. Instead of prohibiting experiments upon living canines, this particular measure makes it a misdemeanor for any person to operate or experiment upon a living dog in the District of Columbia or the Territories, except for the purpose of healing or curing the dog.

Oleomargarine Again—Hearings on Senator Norbeck's bill to extend the definition of oleomargarine to include substances churned, emulsified, or mixed in cream, milk, water, or other liquid, and containing moisture in excess of 1 per centum, were begun on March 27, 1928. Representatives of the U. S. Department of Agriculture, the Bureau of Internal Revenue, and various national dairy associations appeared in favor of the bill, while a Chicago lawyer representing the Baltimore Butterine Company, and the E. S. Vail Butteryne Company of Chicago appeared in opposition. He stated that manufacturers of

* For later developments, see page 639.

oleomargarine were back of the bill, the object of it being to eliminate the markets for yellow vegetable oil cooking products.

No money appropriated for the support of any ward, officer, or employe of the United States Government, civil or military, or for any veteran could henceforth be spent on oleomargarine, filled milk, or other alleged substitute for butter or other dairy products, according to a bill, H. R. 12246, introduced in the House by Mr. Sweet.

A bill, S. 3737, relative to the taxing of oleomargarine has been introduced by Senator Tydings.

An Osteopath as Surgeon General—Characterizing it as "a vicious medical practice bill," the *Journal of the American Medical Association* seems greatly alarmed by a measure proposed by the only physician in the United States Senate, Dr. R. S. Copeland. According to this magazine for March 17, 1928, "Osteopath surgeon generals of the Army, Navy and U. S. Public Health Service are a possibility if a bill (S. 3592) introduced in Congress by Senator Copeland, March 10, becomes a law." The bill of the Hon. R. S. Copeland, M.D., provides that the degrees of doctor of medicine and doctor of osteopathy shall be accorded the same rights and privileges under governmental regulations, whatever this phrase means.

A proposal to regulate osteopathy in the District of Columbia, H. R. 16, was favorably reported to the House on March 28 and discussed at length in the House on April 9, though without action other than talk.

The chiropractors have also received some recognition from Dr. Copeland, for at hearings on a medical practice bill for the District of Columbia before a subcommittee of which he is chairman, Senator Copeland agreed to the contention of these cultists, supported by Senator Capper, that they should have a separate examining board, mentioned by name in a medical practice bill for the District.

Honors for the Heroes of Health—Recognition for the survivors of the famous yellow fever experiments in Cuba and also for the wives of those concerned who have died is contained in bills submitted to Congress, in the House by Mr. Wainwright as H. R. 11686, and the Senate by Dr. Copeland as S. 3364.

The persons whose names the War Department would be directed to place on its roles and pay $250 a month are as follows:

Mrs. Walter Reed
Mrs. James Carroll
Mrs. Jesse W. Lazear
Dr. Aristides Agramonte
Pvt. John H. Andrus
Mr. John R. Bullard
Pvt. A. W. Covington
Pvt. William Dean
Pvt. Wallace Forbes
Pvt. Levi E. Falk
Pvt. P. Hamann
Pvt. James F. Hanberry
Mrs. Warren G. Jernegan
Pvt. John R. Kissinger
Mr. John J. Moran
Pvt. William Olson
Pvt. Charles G. Sonntag
Pvt. Clyde L. West
Dr. R. P. Cooke
Pvt. Thomas M. England
Pvt. James Hildebrand
Pvt. Edward Weatherwalks

The bill also calls for a National Honors Commission of seven who would investigate all cases of distinguished service of public servants by voluntary risk of life or health and recommend proper recognition for such service.

On March 15 the House passed a resolution to change the name of the Ancon Hospital in the Canal Zone to the Gorgas Hospital.

Gorgas Memorial Laboratory—Apparently without a dissenting voice and amid lavish praise for General Gorgas, the House on March 28 passed the bill, H. R. 8128, to authorize a permanent annual appropriation for the maintenance and operation of the Gorgas Memorial Laboratory in Panama. The measure calls for $50,000 to be paid to a benevolent corporation organized to establish and maintain this laboratory for the study of tropical and preventive medicine. The Republic of Panama has already donated the site, and the president of this republic has pledged an appropriation of half a million dollars or more for the construction of the laboratory. By the terms of the bill each of the Latin-American countries is to be invited to contribute, the total not to exceed 75 per cent of that appropriated by the United States. One member of Congress seemed to express the sentiments of the whole House when he said, "I think the passage of this bill is the best thing we can do from the national standpoint, from sanitary and health needs, and from the standpoint of admiration for and as a memorial to one of the world's greatest physicians." Then the House broke into applause.

Other Matters before Congress—A revision of the International Sanitary Convention of 1912 has been ratified by the Senate. The text of this treaty appears in full in the *Congressional Record* for March 22, 1928. In addition to the numerous bills granting federal medical relief to various classes of veterans suffering from tuberculosis, a new one, H. R. 11948, would extend such relief to any person discharged from the Navy or Marine Corps who contracted the disease as a result of duty. A bill for the advancement of funds in connection with the enforcement of acts relating to narcotic drugs passed the Senate on March 22. A $15,000,000 hospitalization program has been agreed upon by the Committee on World War Veterans' Legislation of the House and was to be embodied in legislation.

An interesting study of pending legislation relating to federal medical and surgical relief for diseases and injuries of civil life, by Dr. William C. Woodward, appears in the American Medical Association *Bulletin* for February, 1928.

A case of Medical Negligence in Ohio—A physician who treats a patient for smallpox must report the case to the health officer, and it is also his duty to warn other persons, who are known by him to be in dangerous proximity to the patient, of the existence of the disease. Failure to perform this duty will constitute negligence on the part of the physician and a person injured thereby may recover damages. Instructions to this effect must be given by a trial court in its charge to the jury, and a refusal to do so constitutes prejudicial error.

These principles outlining the proper duties of physicians have recently been enunciated by the Supreme Court of Ohio in the case of Jones v. Stanko, a copy of which has been sent us by James E. Bauman of the State Department of Health. The facts were that from a Tuesday to the following Saturday, one Dr. Washington L. Jones attended a patient who had black smallpox. This physician did not report the disease to the local health officer, and he permitted Mr. Stanko to wait on the patient, assuring Mr. Stanko that no danger was involved in such service.

Both the patient and Mr. Stanko died of black smallpox, the latter death obviously being due to the incompetence or negligence of the physician. The law requires a man who engages in the general practice of the medical profession to know when he is dealing with diseases which are dangerously contagious, and he must exercise ordinary skill and care relative to these matters.

The trial court refused to charge the

jury as to the negligence of the physician and he won the case there. This decision was properly reversed by the Court of Appeals, whose action was sustained on appeal to the court of last resort in the state, the Ohio Supreme Court. This is a good decision, promoting public health by pointing clearly to the duties of the physician to the people.

Miscellaneous Items—The Chicago drainage cases were set for a hearing on April 23 before the U. S. Supreme Court on exceptions to the report of the special master, Charles Evans Hughes.

A donation to a fund to combat disease is deductible in computing income tax, in the opinion of the General Counsel of the U. S. Bureau of Internal Revenue (Memo. 3016). The opinion, with the method of computation in the particular case is given in the *United States Daily* for March 19, 1928.

A world conference of immigration, including consideration of health, opened at Havana on March 31.

The United States sent an unofficial delegate to attend the opium conference at Geneva beginning April 12.

Provisions in state laws for indemnities for tuberculous cattle is given in the *Congressional Record* for March 28, 1928 (page 5707).

A tack in a dish of strawberries which later lodged in a customer's jaw has been held not to constitute evidence of negligence by a restaurant keeper, according to a recent decision of the U. S. Circuit Court of Appeals for the Third Circuit, Horn & Hardart Baking Co. v. Lieber.

Conviction for the illegal taking of clams from areas proscribed by the State Department of Public Health has been upheld in Massachusetts in Com. v. St. John, 159 N. E. 599.

CONFERENCES

May 10-12, American Association of Hospital Workers, Memphis, Tenn.

May 23, American Climatological and Clinical Association, Washington, D. C.

May 23-26, American Physical Education Association, Baltimore, Md.

May 28-June 2, American Library Association, West Baden, Ind.

May 28-June 7, General Federation of Women's Clubs, San Antonio, Tex.

June 4-9, Biennial Nurses Convention, Louisville, Ky. (American Nurses Association, National League of Nursing Education, National Organization for Public Health Nursing)

June 8-9, Conference of State and Provincial Health Authorities of North America, St. Paul, Minn.

June 12, American Heart Association, Minneapolis, Minn.

June 18, Regional Meeting American Public Health Association, Portland, Ore.

June 18-23, National Tuberculosis Association, Portland, Ore.

June 20, Canadian Tuberculosis Association, Charlottetown, P. E. I.

June 25-29, American Home Economics Association, Des Moines, Ia.

July 8-12, Congrès International de la Protection l'Enfance, Paris, France.

July 8-13, First World Congress of Social Workers, Paris, France.

July 16-21, Thirty-ninth Congress Royal Sanitary Institute, Plymouth, England.

December 28, International Congress of Tropical Medicine and Hygiene, Cairo, Egypt.

October 15-19, American Public Health Association, Chicago, Ill.

BOOKS AND REPORTS

The Principles of Ante-Natal and Post-Natal Child Hygiene—*By W. M. Feldman, M. D., M. R. C. P. (Lond.), F. R. S., (Edin.), London: John Bale, Sons & Danielsson, Ltd.,* 1927. Price 25s. (American Public Health Association, $7.50.)

This is a type of book which one reads with delight, but reviews with a great feeling of diffidence. Indeed criticism of such a book can only be regarded as presumption on the part of the majority of reviewers.

It is divided into three parts, the first of which defines the subject, gives a general survey of it, a most interesting chapter on the history and development of child hygiene, statistical methods, antenatal and intranatal mortality and maternal mortality. The second part is devoted to antenatal hygiene, while the third part is given to hygiene from birth through the childhood stage, with a short chapter on "Adolescence or Puberty."

In reading the chapters, one finds no question left unanswered, and though some deal with rather difficult subjects, they are written in such clear language that the understanding of them is easy to any educated person. The only exception to this statement is the one on biometrics which, though clearly put, will be found difficult by many readers. It requires some training in mathematics.

The author well states in his preface that he believes this is the first book of its kind in any language. It is designed to appeal to educated and thoughtful persons, whether lay or professional, who are interested in the welfare of children, and, we might add, the race.

The book gives many quotations from ancient as well as modern writers. It is abundantly illustrated and contains a large number of portraits of those who have worked for the benefit of children, in the past as well as more recently, in addition to which there are 159 illustrations in the text. Among the illustrations one of particular interest shows the headstones of Benjamin Jesty and his wife, the inscriptions on which are easily legible. Besides the illustrations and photographs, there are many tables and charts.

We feel safe in predicting that for many years this book will hold its own as a standard text and reference. It is written as a companion volume to *The Principles of Ante-natal and Post-natal Child Physiology,* which appeared in 1920, and was favorably received. The printing of the book is excellent, but unlike most English books, the paper used is heavy and does not have a mat surface.

This book deserves a longer and more detailed notice, though it would be impossible to mention the many things worthy of special commendation. It must be read to be appreciated.

M. P. RAVENEL

The Chemistry of Water and Sewage Treatment—*By Arthur M. Buswell. New York: Chemical Catalog Co.* 1928. 362 pp. Price, $7.00.

While written primarily for chemists, this book is of much interest to the sanitary engineer and the biologist interested in water purification and sewage treatment. The author prefaces the more technical discussions with two introductory chapters dealing with recent developments in chemical theory and with the chemistry of colloids. Although to the

chemist, it may seem almost absurd to discuss the subject of colloids in 20 pages, such a condensed and well written presentation is a boon to the bacteriologist.

The chemistry of water treatment is discussed in chapters dealing with water softening, filtration and disinfection. One chapter is devoted to the chemistry of coagulation and is particularly to be commended. No attempt is made to give detailed descriptions of filters or to describe operating practice.

The chapters on sewage are of interest because the author has attempted to collect and digest our knowledge on the biology of the methods. The statement, "comparatively little biological data of practical value are available" cannot be too strongly emphasized. There has been a tendency to regard the changes which take place in the trickling filter and in the activated sludge process as purely physico-chemical in character. We are glad to find that the author does not sympathize with this point of view, but apparently believes that colloidal reactions and bio-chemical changes induced by microörganisms are at least equally important.

The book is a real contribution to what we hope some day to be able to call "the science" of water and sewage treatment. JOHN F. NORTON

Pulmonary Tuberculosis—*By David C. Muthu, M.D. (2d. ed.) New York: William Wood,* 1927. 381 pp. Price, $5.00.

In this second edition of his book, Dr. Muthu has added an introduction of some 120 pages to his old text. In fact, there is very little change in the old text and the only new thing about the book is the introduction.

In it the author takes up discussion of the tuberculosis problem from the statistical, research, clinical and environmental points of view, with some extraneous observations at the end on tuberculosis in India. As a summary of existing knowledge of tuberculosis work, the book has some merit and would have more if it were not for the fact that the author seems to have gone on the fallacious theory that everything appearing in print is authentic. For example, Abrams of late lamented quack fame, with his electronic theory which has been so completely discredited in this country, has been quoted with such authorities as Koch, Webb, Calmette and other workers of genuine responsability and fame. Even more, the author goes out of his way to give a somewhat fulsome laudation to the Abram's theory, which is enough to discredit the book entirely. PHILIP P. JACOBS

The Concise Oxford Dictionary of Current English—*Adapted by H. W. Fowler and F. G. Fowler. Oxford University Press,* 1926. 1064 pp. Buckram. Price $3.50.

To everyone interested in the correct use of words, this dictionary will be a joy. The names of the two men who have adapted it from the *Oxford English Dictionary* are sufficient guarantee of its value, and those who have used *A Dictionary of Modern English Usage,* by one of the authors of this book, will be especially glad to have the present volume.

While holding to many of the usages which we Americans recognize as typically English, the authors have given way to a certain extent, though they have "stopped short of recognizing forms that at present strike every reader as Americanisms."

The book is well printed, though some typographical errors have been found. It may be had in a number of bindings, on various papers, and indexed, the prices running as high as $17.50 per copy. It can be unreservedly recommended to everyone, and especially to those who attempt to write.

M. P. RAVENEL

A Treatise on Hygiene and Public Health—*With Special Reference to the Tropics*—*By Birendra Nath Ghosh, F.R.F.P. & S. (Glasg.) Revised and largely rewritten with the advice and assistance of Colonel A. B. Fry, M.D., (Lond.), D.P.H., (6th ed. rev.) Calcutta: Scientific Publishing Co.*, 1927. Price, 10 s.

When an author is called upon for six editions in a period of 15 years, he is entitled to believe that his work has been successful. The first four editions of this book were written in connection with J. L. Das. The last two have been published under the present author's name.

The text considers the usual subjects commonly discussed under the head of hygiene and public health, but this book is particularly interesting as giving us conditions as seen in India. There were certain defects in the fifth edition which have been largely remedied in the sixth. We believe, however, that too little is said about dried milk, for example, to which only a few lines are devoted.

The author advocates cremation, which is needed in India probably more than any other country in the world. When we remember the overcrowding and the beliefs which have become ingrained through many generations, we can appreciate the difficulties which the hygienist faces in that country. Infant and maternal mortality are still terrifying, and it is estimated that from 60,000 to 75,000 women die every year from conditions connected with child bearing.

Vitamins are included in this edition, though there is some confusion about the name. Funk believed that they were amines, and only later has the "e" been dropped from the name as given by their discoverer.

The volume bears throughout the stamp of careful study, honest interpretation of the facts, and common sense. The English is exceptionally good, in spite of the fact that it is not the native language of the author. A glossary giving the English equivalents of the Indian names used would improve the book, though most are found somewhere in the text. The illustrations and printing are good. The book doubtless does an enormous amount of good in the country for which it is written, and can be read by all hygienists with pleasure as well as profit. M. P. RAVENEL

Cultivating the Child's Appetite—*By Charles Anderson Aldrich, M.D. Macmillan*, 1927. 127 pp. Price, $1.60.

Dr. Aldrich's book covers a very important subject in a most unusual way. It is simple, straightforward and to the point. I believe every mother would profit greatly by reading it and the children should profit even more.

There are a few important points to which I take some exception:

More stress should be laid on the fact that anorexia is due to the shortcomings of the parents rather than to the children. Of course, there may be a few exceptions and these are due to outside influence such as teachers or nurses. This is very well illustrated by the fact that poor children are seldom afflicted while the children of the rich are very commonly affected in this way.

More stress should be laid on causes for this condition. I believe the cause of poor appetite is very largely physical. It is the result of disease or at least an abnormal condition of the patient. Any child with a poor appetite should be considered sick. The causes of this condition are too much excitement, too much discipline, too much work. More is expected of the rich child than of the average child and in consequence the former falls under the load he is forced to carry. He may appear all right but in reality is not well. Instinct tells him not to eat and if left to himself long enough he will correct the condition. When a child does not want to eat it should not be forced. ROBERT E. HUMPHRIES

An Experiment With Time—*By J. W. Dunne.* New York: Macmillan, 1927. 208 pp. Price, $2.50.

The only way to find out whether the author is dealing with real experience or with a hoax in the grand style is to try to repeat his "experiments." These experiments consist of recording as fully as possible details of what is in one's mind at the moment of waking or when in a semi-dormant condition, and subsequently comparing these items with waking experience. In a large number of cases the experimenter will discover these dreams have anticipated events. What that proportion is can never be ascertained of course, since we notice only what we notice, and we shall not notice the dreams which are never recalled in subsequent waking experience; nor should we count the dream items that have to do with commonplace events and experiences that occur before as well as after the time of our record. Mr. Dunne speculates learnedly on the nature of space and time, and leaves us with the impression that perhaps our time experience is after all reversible. While he has a number of very striking examples of dream stuff apparently anticipating experience, it must be said that most of his stories represent no more than the fact that a minute fragment of the situation is capable of recalling a totally different situation in which a few elements are present in common. Until we have a large body of similar "observations" against which it is possible to check, we shall not be convinced that Mr. Dunne has really discovered a novel quality in the structure of time.

The book on a whole is an introduction to a new interpretation of the universe which the author calls serialism, with distinct psychological, theological, and teleological aspects. It is proverbially difficult for a new philosophy to gain recognition; and the reviewer would really like to help.

B. C. GRUENBERG

The Bacteriolytic Tank System in South Australia—*By W. Ramsay Smith, M.D., D.Sc., F.R.S. (Edin.) (7th ed.) Adelaide: Gov. Printer, 1927, 48 pp.*

This pamphlet contains very little new information. Its scope "is limited to the problems of sanitation in unsewered areas, the sanitary appliances that are obtainable and the sanitary standards that are attainable in such areas."

To those interested in the background of the septic (bacteriolytic) tank in Australia and the literature thereon, portions of the pamphlet will be valuable.

The description of the tank is sufficient to permit an understanding of it, but from the viewpoint of practice in this country the sketches and plans included in the pamphlet could not be considered as particularly useful in helping the rural house owner to build his own tank. In parallel pamphlets published here, much space usually is devoted to the careful and detailed explanation of form-building; the lumber needed therefor; concrete mixing and such related matters. Explanations of this variety are lacking in this pamphlet.

The last four chapters are devoted to discussing a number of Australian installations; what goes on in the tank; the control of the use of such tanks by the official health agencies of Australia; and the economic value of the tank system to that country. ARTHUR P. MILLER

The Human Body in Pictures—*By Jacob Sarnoff, M. D. Brooklyn, N. Y.: Physicians and Surgeons Book Co.,* 1927. 120 pp. Price $2.00.

This is a unique presentation of a visual text of anatomy, physiology and embryology. It is written in a simple compact style. With its wealth of illustration it should appeal to high school students, especially if correlated with their other science work. This book appears to be one of a series on the human body presented by film slides, motion pictures and textbook. B.C.G.

Diseases of the Skin—*By Henry H. Hazen, A. M., M. D., (3rd ed.) 248 ill. St. Louis: Mosby,* 1927. Price, $10.00.

A book which has reached the third edition has already run the gauntlet of professional criticism, and if it has met with success, which is usually proved by the demand for new editions, it needs little comment. A striking feature of the present edition is the omission of the usual long discussions on eczema, though the name is still retained in one case, and as a synonym in two others, in spite of the fact that the author states in his preface that the word has been omitted. The wisdom of this is shown by quotations from two other dermatologists:

> Eczema is a term commonly applied to any wet or scaly inflammation of the skin, of the cause or nature of which the observer is ignorant.
>
> . . . . Eczema is only a sort of dermatological scrap heap out of which from time to time, certain diseases that present a characteristic and definite symptomatology are extracted.

The various skin manifestations of anaphylaxis are given more attention than usual. We commend the author also for omitting the bibliography which, as he says, has been found to be of no value to students.

The book is beautifully printed, has very few errors, and is abundantly illustrated with excellent photographs, most of which are original with the author. We wish our American publishers would use the light paper now available. Although this book contains only 572 pages, its weight is burdensome.

M. P. RAVENEL

Health Problems in Organized Society—*Studies in the Social Aspects of Public Health—By Sir Arthur Newsholme, K.C.B., M.D. London: P. S. King & Son, Ltd., Orchard House, Westminster,* 1927. 253 pp. Price, $3.50.

The chapters contained in this volume are made up of lectures and addresses given over a period of several years in America and in England. A book of this character is not easy to review, since so many different matters are treated. There is some repetition, which the author has lessened to a great extent by cross references. Each chapter, however, considers the social aspect of the particular problem under discussion, and stress is laid on the importance of cultivating the sense of personal as well as communal responsibility, and the ethical side of public health work. The author feels that it is more important to secure for each child the fullest mental and moral development possible, than to extend research into diseases, the causes of which are still unknown, though he does not belittle the importance of research.

There are 19 chapters, each of which is well worth reading. The author has been a teacher and public health administrator for 45 years. He has read widely, and frequently gives striking quotations from older writers, whose works are unknown to the majority of the present generation. Throughout the book, he lays especial stress on the moral side of preventive medicine, holding that the health officer who concerns himself only with measures for preventing infection is bound to find his efforts sterile. Alcoholism, tuberculosis and venereal disease have been chosen as the three great subjects with which to illustrate the possibilities of life saving and national health improvement.

There are several chapters on the history of the control of alcohol, besides frequent references to it, the author being strongly in favor of prohibition. While interesting, we believe that he has accepted evidence which is far from having been proved, and some of which has been disproved.

The last two chapters are devoted to the problem of population, in which he confesses that he shows his personal bias in regard to disputed matters. Here again, we think that he has overlooked some facts. He says that the forecasts made by Malthus have proved to be false

up to the present time, though he acknowledges that the population of the world has more than doubled in the last hundred years. He discusses various factors which have interfered with what Malthus predicted, pointing out the changed trend of population seen in Western European countries and America, and believes that it is due to widespread use of contraceptive measures.

The book as a whole shows the distinguished author at his best. Few living men have been so closely in touch with the growth of public health, especially in England, but also in other countries, and none have used their opportunities to better advantage.

Perhaps the most striking feature of the book is the high moral standards which are inculcated, on which everything else seems to depend. He believes strongly in education, holding that the best educator is the man who waits on and aids the development of the human mind, and that our "basic need is to train the behavior of the individual in the varying circumstances of life," the lack of such training being responsible for the continuance of a vast amount of preventable disease.

The printing and make-up of the book are exceptionally good. The paper used is of the light weight so generally found in English books, and so often not found in those of American origin.

M. P. RAVENEL

To Whom It May Concern: A Popular Address About Smallpox and Vaccination—*By William Wanklyn. London: The Voluntary Service Fund.* 1927. Price 1/6.

The Case Against Vaccination—*By Councillor W. Asbury. London: Journal of the Royal Sanitary Institute.* Vol. XLVIII, No. 4, 1927.

From deep convictions growing out of many years of field experience with smallpox, both as physician and as special consultant for the London and other county councils, Dr. Wanklyn writes with remarkable restraint, and earnestly appeals to his fellow citizens to join in a united effort "to clear smallpox right out of the country once and for all," by means of systematic use of vaccination. There are many dramatic personal episodes, as well as some useful statistical and historical material.

Equally earnest is Councillor Asbury of Sheffield City Council, in his opposition to vaccination. Like so many lay partisans he rests his case primarily on the older fears and suspicions. After all, it is not obvious how so "unnatural" and bizarre a procedure as vaccination can bring about immunity to smallpox. Moreover, fashions and claims have undergone many changes, and there have been deaths and disasters closely associated with vaccination which the writer is unable to reconcile with the vaccinator's present position. Fragmentary quotations from authorities and from statistical records can of course be offset by other quotations; he uses only one set.

The councillor is worried, and it is manifestly insufficient for those who favor vaccination to shout louder.

B. C. GRUENBERG

Boiler Feed Water Purification—*By S. T. Powell. New York: McGraw-Hill.* 1927. 363 pp. Price, $4.00.

The purification of water for industrial purposes is largely a problem for the factory although several cities in this country have municipal softening plants in operation. Water softening is also practiced in homes located in hard water regions. The discussions in this book deal with all phases of the problems involved, such as chemical coagulation, filtration, various methods of softening, distillation, the use of boiler compounds, prevention of foaming and priming and of corrosion and the use of feed water heaters. Methods for the analysis of boiler waters are given in detail.

JOHN F. NORTON

HEALTH DEPARTMENT AND OTHER REPORTS

IRA V. HISCOCK

Providence, R. I.—A valuable set of public health, milk inspection, and vital statistics reports for the year 1926 has been received from Providence. These reports conform in attractive appearance, good printing and subject content to the high standard established in this city many years ago. They are worthy of study by health administrators.

The report of the superintendent of health gives a birth rate of 22.5, a death rate of 13.1, and a marriage rate of 15.9 for the year. A classified financial statement for this city of 270,400 population shows that $192,937 were expended by the health department, but of this amount, $93,259 were expended for garbage removal. One of the interesting features of the report is a section on the appraisal of health work in Providence according to functions.

In a section dealing with the supervision of infants and preschool children, it is interesting to note that the distribution of prenatal letters to prospective mothers was begun in October, 1925. From that time to the end of 1926, 1,379 requests were received for these prenatal letters. Five nurses supervise the babies delivered by midwives, up to 2 years of age; one nurse supervises the infants and young children in licensed boarding homes and the infants of such unmarried mothers as are not under the supervision of private agencies; one nurse makes one visit upon each infant delivered by a physician, provided the mother is not on the maternity service of the District Nursing Association, or delivered at the Lying-in Hospital. Thirteen child welfare stations were carried on by the Providence Child Welfare committee, the examining doctors being engaged and paid by the health department. The district nurse association employs 17 nurses on its children's services and during the year they had 5,993 infants and preschool children (68 per cent under 1 year) under supervision. The nurses made 38,452 home visits to these children in addition to 3,999 prenatal visits to 1,403 prospective mothers. A total of 10,308 visits were made by infants and young children to the welfare stations. In a newly opened preschool clinic, children not only are given a complete physical examination, but generally receive toxin-antitoxin treatment for diphtheria immunization. An infant mortality rate of 68 is recorded.

Of the 20,646 school children examined, 59 per cent were found to have defects. Treatment of defects was secured in 70 per cent of the instances recommended. Among the special classes and clinics there is a psychiatric clinic where 483 examinations were made. Several of the problem cases were fully studied at the Problem Clinic of the Rhode Island Hospital and at the Mental Health Center at the Esek Hopkins School. There are 11 open air schools, 2 for pupils of grammar grades and 9 for primary grade children. A school for crippled children was opened in 1925, where a physician examines all applicants upon admission and before leaving.

The superintendent of health is also ex-officio inspector of milk. According to regulations effective January 1, 1926, it was provided that all milk sold in Providence should be certified or from cows under government supervision, or pasteurized. Milk from cows under government supervision must not have more than 100,000 bacteria per c.c., and pasteurized milk must not have over 1,500,000 before pasteurization, and not over 100,000 after pasteurization. A law enacted at the instigation of the farming interests has fixed the maximum

bacterial content of Grade A pasteurized milk as 25,000. The average bacterial count of the Grade A pasteurized milk sold under the state law after July 1 was 12,000.

The vital statistics report contains important tables frequently used. Deaths are classified by months, according to sex, marital condition, color, nativity and parentage; by month and cause; and by sex, age and cause (International List). Births are classified according to season, sex and color; and according to number of child and age of mother. Of the 6,090 births, 2,576 occurred in hospitals. A general summary table, condensed into 5-year periods, gives important statistical data since 1855. Deaths under one year are classified by cause and age, as well as according to nativity of mothers.

Queensland—The annual report of the Commissioner of Public Health for the year ending June 30, 1927, opens with brief statistical records of the birth, death and infant mortality rates for that state and also for other states of the Commonwealth and several parts of the Empire. Infant mortality rates in 1926 are noted as varying from 39.8 in New Zealand and 50.4 in Queensland, to 57.6 in New South Wales. Diphtheria apparently reached its peak during the year, although not confined to a particular area.

Arising out of a deputation representing the Australian Coachmakers Employees' Federation and the House Painters' Union, which waited upon the Minister with reference to the use of the spray "gun" in the application of paints and the toxicity of the substances employed in such processes, samples of all "spray paints" in use upon the local market were procured and have been analyzed by the government analyst. As a result of the discovery that soda and water issued from certain soda fountains contained lead in excessive amounts, a series of samples were obtained from all cafes and refreshment rooms. This necessitated the dismantling and overhauling of a large number of fountains when it was found that the interiors of certain carbonators were jointed at the seams, at the ends of agitator shafts, and elsewhere with solder which contained lead. All faulty solder was replaced with lead-free material, and in numerous instances fresh tin lining was provided.

Madras—Features of the health officer's 1926 report which first impress the reader are the size of page (8¼"x 13"), the large size of type and the soft paper. Paper of glossy finish is used here only when photographs or statistical charts are included. The report occupies 209 pages. High mortality and morbidity rates are explained to a considerable extent on the basis of economic problems. Considerable laboratory work has been carried on in the control of water supplies. Housing inspection has been active and attention is directed to the need of a comprehensive development plan of housing for the entire city, based on a scientific as well as a business viewpoint. The National Health and Baby Week celebrations were conducted in the South Indian Athletic Association grounds and premises from the 14th to the 20th of January. Charts, posters, health models, and leaflets were widely utilized. Excellent photographs of the child welfare motor car and of maternity and infant clinics add interest to the report.

Education of Employed Youth—The proceedings of a special conference held in New York* on the education of employed youth are worthy of study by educators and health workers. A carefully prepared article on health education in the continuation schools presents data

* The University of the State of New York, Albany, 1927.

which suggest among other things the shortcomings of School medical and nursing programs as at present carried out. "We had either failed completely to recognize persistent defects or had failed to persuade the families of boys of the desirability of improving or correcting the various types of physical defects discovered."

It is stated that before planning any system of health instruction in continuation schools, the type of audience and the background must be considered. Youth in industry must be cautioned effectively against the kind of hazards they are facing and where there are continuation schools in communities, where certain types of industries are likely to absorb children, special attention should be paid to train the children in the avoidance of the hazards in the particular industries. "There can not be any really effective education of the children in continuation schools until they have a point of departure for their education, and by that I mean a thorough medical examination." It is emphasized that there is no greater damage to health, to resistance to disease, than allowing children of school age to have insufficient sleep and rest. Special precautions in this regard are necessary for children who have the combined burden of earning a living and at the same time keeping on in school education. An outline of a "practical health program for employed children" is contained in this report for the guidance of those concerned with the organization of the health and recreation work in the continuation schools.

Hamilton, O.—A journey through the city health district of Hamilton, during the last 3 months of 1927, is made possible for readers of the sanitary report by means of many cartoons, with brief tabular material and discussion. The form of presentation is sufficiently unique to cause the average reader to peruse the entire report. Information is given regarding the scores of barber shops, dairies, restaurants, confectionery and grocery stores, ice cream plants, markets, and drug stores. The periodic health examination by the family physician is featured.

Scott County, Ky.—The population of Scott County is indicated in the 1927 annual report of the Health Unit as follows: white 13,800, colored 1,518. This county covers an area of 290 square miles, there being 2,753 homes and a school enrollment of 2,800. The director of the health department emphasizes the value of the coöperation received from the medical profession, educational institutions, the press and civic clubs. Laboratory services have been rendered by the State Board of Health and experiment stations. Physical examinations have been made of children in the rural and city schools and the college, defects have been noted and efforts have been made by the follow up work of the nurses to secure their correction. Commendable progress has been made in health education by means of lectures, bulletins and nursing follow up work.

The Rotary Club has coöperated in educational work and has offered as a stimulus for better conditions in rural schools two attractive prizes. These prizes are awarded to the schools attaining the highest point of efficiency, as governed by the following requirements: vaccination, heating, ventilation, foundation, lighting, seats, water supply, water service, toilets, playground and attendance. During the 5-year period preceding the full time health department, there was an average of 218 deaths in the county as compared with an average of 189 annual deaths during the 5-year period of the full time department. Particularly noteworthy has been the reduction of deaths of infants under one year of age.

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HARDY, A. V. Malta Fever: A Problem for State and Municipal Laboratories. Pub. Health Rep., 43:9 (Mar. 2), 1928.

Differential Diagnosis—Smallpox, Chicken Pox—A useful summary of the points of differential diagnosis between smallpox and chicken pox, including distribution, appearance, development of lesions, and the history of the case.

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VERGEER. T. *Diphyllobothrium latum*, the Broad Tapeworm of Man. J. A. M. A., 90:9 (Mar. 3), 1928.

Sterilizing Milk Bottles—The more general use of individual milk bottles as serving containers leads to the question

of adequate chemical sterilization. Calcium hypochlorite solution even at 500 parts per million cannot be depended upon to kill human tubercle bacilli, but available chlorine of a strength of 95 parts per million will kill in three minutes.

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NEWS FROM THE FIELD

SUMMER SCHOOL COURSES IN PUBLIC HEALTH

UNIVERSITIES and technical schools throughout the country are offering courses in public health and preventive medicine during their summer sessions. The following does not pretend to be a complete list of schools giving such courses this summer, but it represents the schools that replied to the circularization made by the *American Journal of Public Health and The Nation's Health* for the benefit of those readers who contemplate pursuing study in public health this summer.

UNIVERSITY OF CHICAGO, Chicago, Ill.
June 18-July 25 (First term)
July 25-August 31 (Second term)
Hygiene and Bacteriology
Public Hygiene. This will deal with problems of community hygiene such as water supply, sewage disposal, food supply, infant welfare, tuberculosis, insect-borne infections.
Immunity in Relation to Preventive Medicine
Public Health Problems
Sanitary Surveys
Public Health Nursing. Supervision in Public Health Nursing.
School Hygiene
Physical Education

COLUMBIA UNIVERSITY, DeLamar Institute of Public Health, College of Physicians and Surgeons, New York, N. Y. July 9-August 17.
School Health Inspection
Administration of Health Work in Schools
Organization and Supervision of Health Education
Teaching of Health in Secondary Schools and Colleges
Health Care of Children
Research in Child Health
Physical Education
Nutrition in Health Education
Mental Hygiene
Public Health Nursing
School Nursing
Nursing Supervision in Clinics and Out-Patient Departments
Sanitary Science
Industrial Medicine
Public Health Administration
Bacteriology
Public Health Engineering

CORNELL UNIVERSITY, Ithaca, N. Y. Opening July 3.
Physical Education. Course in the organization, administration and methods of teaching physical education.
Measurements of School Children. This course will stress the practical application to problems of growth and development.
Hygiene of the School Child and Adolescent
Health Inspection of School Children
This course is planned to familiarize teachers with facts and methods necessary for making an effective health inspection of school children.

HARVARD UNIVERSITY, Cambridge, Mass. July 2-August 11.
Principles and Problems of Hygiene. This will emphasize disease prevention and also the interpretation and organization of material in hygiene for instruction and application.
Physical Education

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Mass. July 2-August 14

Methods of Teaching General Biology
Bacteriology
Health Education Methods
Hygiene of School Child
Public Health Laboratory Methods
Public Health Institutes for Health Officers and Public Health Workers

MICHIGAN STATE COLLEGE, East Lansing, Mich. June 18-July 27.
Medical Biology. This course is designed for persons trained in hospital and public health laboratory procedure.
Bacteriology
Hygiene

UNIVERSITY OF MICHIGAN, Ann Arbor, Mich. June 25-August 17
General Hygiene and Public Health
School Hygiene
Methods and Materials in Health Education
Public Health Nursing, Principles and Administration
Public Health Institutes will be held each Friday and Saturday throughout the six weeks of the summer session for intensified study in public health work.

UNIVERSITY OF MISSOURI, Columbia, Mo. June 7-August 3
Physical Education
Nursing

UNIVERSITY OF NEW MEXICO, Albuquerque, N. M.
The Elements of School Health. This course of 16 lectures will be given by members of the staff of the New Mexico Bureau of Public Health.

NEW YORK UNIVERSITY, New York, N. Y. July 9-August 17.
Education in Health. This course is designed for superintendents, principals, teachers, and others responsible for health instruction and supervision in schools.
Health of School Children

NORTHWESTERN UNIVERSITY, Evanston, Ill.
Physical Education and Hygiene for Public Schools

OREGON STATE AGRICULTURAL SCHOOL, Corvallis, Ore. June 18-July 27.
Methods of Health Education
Problems in Nutrition
Child Care Nursing
Physical Education
Home Economics

PENNSYLVANIA SCHOOL OF SOCIAL AND HEALTH WORK, Philadelphia, Pa.
Public Health Nursing
Public Hygiene and Sanitation. These courses will be given under the direction of the Department of Public Health Nursing.

UNIVERSITY OF PENNSYLVANIA, Philadelphia, Pa. July 2-August 11
Hygiene and Physical Education

UNIVERSITY OF ROCHESTER, Rochester, N. Y. June 27-August 3
Mental Hygiene of Childhood and Adolescence
Methods in Health Education. This course also includes devices for the development of child health habits and is designed for classroom teachers, physical education directors and school nurses.

STANFORD UNIVERSITY, Palo Alto, Calif. June 21-September 1.
Public Health Nursing
Health Department Administration. This will consist of lectures on the activities, organization and powers of public health departments, supplemented by laboratory work and work in the field.
Physical Education and Hygiene

UNIVERSITY OF WASHINGTON, Seattle Wash.
June 12-July 17 (First term)
July 18-August 22 (Second term)
Principles of Physical Education.
Physical Education Administration.
Nutrition
Bacteriology
Principles of Public Health Nursing and Administration
The Health Education Movement. This course is planned for school administrators and classroom teachers

in elementary and secondary schools and for school nurses.

WESTERN RESERVE UNIVERSITY, School of Applied Social Sciences, Cleveland, O. June 18-July 27.

Principles and Practices of Public Health Nursing

Health Education

Psychiatry

UNIVERSITY OF WEST VIRGINIA, Morgantown, W. Va.

Hygiene and Sanitation

UNIVERSITY OF WISCONSIN, Madison, Wis. June 25-August 3.

School Hygiene and Health Teaching. This course is arranged especially for principals, superintendents and directors of health education.

Supervision and Organization of Health Education. This course is for those who will give courses in health education, in their own teaching institutions.

Bacteriology (As related to sanitary problems)

Public Health. Lectures and field work for medical students.

CALIFORNIA PUBLIC HEALTH NURSES INSTITUTE

THE annual Institute for Public Health Nurses will be held under the joint auspices of the Summer Session of the University of California and the State Department of Public Health, at Berkeley and Los Angeles. The Berkeley institute will be held July 9 to 20; and the institute at Los Angeles will be held July 23 to August 3, inclusive.

CLINICAL THERMOMETERS

THERE was a conference of manufacturers, distributors and organized users of clinical thermometers on March 30, at the Department of Commerce in Washington, D. C. At this conference a standard for the minimum requirements in manufacturing clinical thermometers was adopted, which will be effective on October 1, 1928, and which allows one year—until March 30, 1929, for the clearance of existing stocks. These standards will be revised annually.

PUBLIC PLAYGROUNDS

THE Harmon Foundation has granted $40,000 for the development during 1928 of permanent public playgrounds in new residential developments. The awards will be directed by the Playground and Recreation Association of America, New York, N. Y.

SAFETY EDUCATION

A graduate fellowship of $1,000 at Teachers' College, Columbia University, for the year 1928-1929 is offered by the National Bureau of Casualty and Surety Underwriters for work on constructing a course of study in Safety Education for Secondary Schools.

ARIZONA HEALTH CONFERENCE

A PUBLIC Health and Sanitary Conference at the University of Arizona, Tucson, arranged by the State Board of Health, was held April 17 and 18. The program included milk inspection and analysis, public water supplies, municipal and rural sewage and garbage disposal, and other public health topics.

BEST BOOK FOR PARENTS

DOUGLAS A. Thom, M.D., Director, Division of Mental Hygiene, Massachusetts Department of Mental Diseases, has been awarded the medal for the best book for parents published during 1927. The medal, which is presented by *Children, The Magazine for Parents,* was awarded for Dr. Thom's book, *Everyday Problems of the Everyday Child.*

THE LABORATORY

A new publication is issued by the Technical Service Department of the Fisher Scientific Co., Pittsburgh, Pa. *The Laboratory* is issued for "those interested in keeping informed on the latest developments of laboratory apparatus and technic." The initial issue carries a description of several new laboratory apparatuses, recently put on the market.

TUBERCULOSIS ERADICATION IN CATTLE

A tabulated summary just issued by the Bureau of Animal Industry, U. S. Department of Agriculture, shows the progress of tuberculosis eradication work in coöperation with the various states. Nearly three-fourths of the number of cattle are in herds which have successfully passed one or more tuberculin tests.

More than 2 million cattle are accredited as free from tuberculosis, as the result of a series of tests. As the result of systematic testing, bovine tuberculosis in the United States is gradually being reduced.

MEDICAL PROGRESS

THE American Association for Medical Progress has published the first issue of a new publication, which will be issued quarterly. This is *Medical Progress*. Benjamin C. Gruenberg, is Editor, and articles have been contributed by Dr. Gladys H. Dick of the John McCormick Institute for Infectious Diseases; James E. Peabody of the United States Congress. Dr. Gruenberg has contributed notes on the commemoration of the four great scientists, whose centenaries are being celebrated this year—Von Baer, Hunter, Harvey and Malphighi. News notes and items of interest are included, which will interest laboratory workers and health officers throughout the country.

ANOTHER SACRIFICE TO SCIENCE

THE most recent worker to lose his life from Rocky Mountain spotted fever is A. Leroy Kerlee, who was employed in the U. S. Public Health Service laboratory at Hamilton, Mont., as a bacteriologist. This disease has caused the death of 4 workers, who contracted it in connection with their researches in the course of official duty. The others are Dr. T. B. McClintic, W. E. Gettinger and G. H. Cowan.

CALIFORNIA HEALTH INSTITUTE

THE Northern California Public Health Association will hold a Public Health Institute in San Francisco, May 28 to June 8, inclusive. The institute will be conducted by Dr. Haven Emerson, Professor of Public Health Administration, Columbia University, New York, N .Y.

VETERAN OF YELLOW FEVER CAMPAIGN

ANOTHER survivor of the yellow fever experiments conducted by Walter Reed and his associates in the U. S. Army in Cuba in 1901 has been found. He is James Hildebrand, of Atlanta, Ga., and is 73 years of age, and almost entirely incapacitated by tuberculosis. The medical board at Gainesville, Ga., gave him a pension as a Spanish War Veteran of $50 a month, on which he and his widowed sister live.

Recently in Congress, the Copeland-Wainwright bill was introduced to provide for these survivors or their dependents, regardless of their military rank or civilian status.

REGISTRATION AREA DRIVE IN TEXAS

IN the special drive being made by Dr. J. C. Anderson, state health officer, to bring Texas in the vital statistics registration area, each justice of the peace throughout the state has been asked to act as local registrar in his own precinct.

PERSONALS

Dr. James W. Loughlin has been appointed health officer of the third district with headquarters at Newcastle, Me., to succeed Dr. George E. Parsons, who has resigned to enter practice at Millinocket, Me.

Walter D. Thurber has resigned because of ill health as executive secretary of the Maine Public Health Association, after 7 years' service, and has moved to California.

Dr. Paul Preble has been loaned by the U. S. Public Health Service to the Maryland State Department of Health to take charge of the Bureau of Vital Statistics pending the selection of a physician to that position; Dr. Preble will continue his work at the Johns Hopkins School of Hygiene and Public Health while with the State Department of Health.

Dr. George G. Eitel bequeathed to the University of Minnesota $80,000 to provide a fund for needy medical students and a loan scholarship.

Dr. Ferdinand C. Helwig has been appointed full-time pathologist to St. Luke's Hospital, Kansas City, Mo.

Dr. Louis J. Wolford, St. Louis, has been appointed to the Missouri Nurse Examiners Board by the governor to succeed the late Dr. Edward W. Saunders.

Dr. Jesse A. King, Ojai, Calif., has been appointed health officer of Ventura County to succeed Dr. Adolph A. Maulhardt.

Dr. Edwin O. Palmer has been appointed superintendent and business manager of the Hollywood Hospital, Los Angeles, Calif.

Dr. Frank E. McCullough has been appointed city health officer of North Sacramento, Calif., to succeed Dr. Archibald A. Atkinson.

Dr. Charles O. Probst, Columbus, O., has been appointed medical director of the Franklin County Tuberculosis Sanatorium, succeeding Dr. Stephen Douglass, resigned.

Health Departments of Hamilton and Butler Counties, O., have combined with Dr. Clifford J. Baldridge as health officer.

Dr. Wm. M. Hardy, assistant secretary of the state medical association, has been elected city health officer of Nashville, Tenn.

Dr. Hugh W. Williams has been elected health officer of Sparta, Wis., to succeed the late Dr. Vernon W. Stiles.

Dr. Gustave Windesheim of Kenosha, Wis., has been elected president of the State Board of Health to succeed Dr. Otho A. Fiedler whose term expired.

Dr. Thomas J. Charlton has been appointed to succeed Dr. Craig Barrow as physician-in-charge of the Georgia Infirmary, Savannah, Ga.

Dr. Guy G. Lunsford, Weston, Ga., has been appointed health officer for Crisp County.

Col. Albert A. Sprague has accepted the chairmanship for the Chicago division of the Leonard Wood Memorial for the Eradication of Leprosy.

Dr. Lang A. Mitchell has been appointed county health officer of Payne, Okla.

Dr. Peter Paul Barron has been appointed health officer of the city of Dorris, Calif. to succeed Dr. Sanford W. Cartwright.

Col. Bailey K. Ashford, medical corps, U. S. Army, has been appointed by the government of Porto Rico as its representative in the International Congress of Tropical Medicine and Hygiene to be held at Cairo, Egypt, December 28.

Dr. George D. Heath, Jr., has been appointed health commissioner of the city of Bloomington, Ill.

GEORGE A. COLLINS has resigned as health officer of Denver, Colo.

DR. F. BOWMAN, formerly epidemiologist for the Wisconsin State Board of Health, has been appointed health officer for Madison, Wis.

DR. FREDERICK C. ANNABEL, health officer of the town of Elmira, Chemung County, N. Y., for twenty years, died on March 10 from pneumonia.

DR. C. R. BOWEN, health officer of the consolidated health districts of Almond and Alfred in Allegany County, N. Y., died February 27 of heart disease. The fact that he served as health officer of Almond for many years prior to 1904 places him as one of the oldest health officers in point of service.

MILDRED G. SMITH, R.N., formerly Educational Agent of the Minnesota State Department of Health, has been appointed Staff Associate of the National Society for the Prevention of Blindness, with headquarters in New York, N. Y.

DR. J. P. BAKER died at Findlay, O., on February 14. He was an outstanding figure in public health work, and was a member of the board of directors of the Ohio Public Health Association, and president of the Board of Health of Findlay.

DWIGHT S. ANDERSON, publicity assistant, National Tuberculosis Association, has joined the staff of Will, Folsome and Smith, hospital financial directors.

LOUISE FRANKLIN BACHE, formerly of the Syracuse Department of Health and Syracuse Community Chest, is now director of publicity of the National Probation Association.

DR. CHARLES BOLDUAN has been appointed director of the Department of Public Health Education, New York City Department of Health.

HAROLD R. HANCE is staff artist of the Michigan Tuberculosis Association.

POSITIONS WANTED

Services of thoroughly qualified graduate sanitarian soon will be available. Experienced in state and municipal public health work, housing, sewerage and sewage disposal, social surveys, municipal waste collection and disposal, sanitary inspections, reports, investigations, etc. Excellent at organization and administration. Let's get together and talk it over. Address 50 W. F.

GRADUATE CIVIL AND SANITARY ENGINEER desires change. Two years as assistant and five years as chief engineer of State Health Department. Also teaching experience in recognized engineering school. Age 31, married. Will consider any kind of responsible employment including teaching sanitary engineering subjects. References furnished upon request. Address 51 F. P.

DIRECTOR OF LARGE PUBLIC HEALTH LABORATORY desires change of position. College graduate. Has organizing and administration ability. Trained and experienced in all forms of laboratory procedure. Address 52 M. C.

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MILK SUPPLY

Report of the
Committee on Milk Supply
of the
American Public Health
Association

SUPPLEMENT to the May, 1928 issue of the
AMERICAN JOURNAL OF PUBLIC HEALTH
and THE NATION'S HEALTH
370 Seventh Avenue - - - - - New York, N. Y.

Milk Supply *

THE Committee on Milk Supply, since it was created in 1917, has limited its activities to subjects on the pasteurization of milk. It has especially directed its attention toward the standards for pasteurizing apparatus, although it has dealt with a number of other subjects which are related to the pasteurization process. The mechanical features and the operation of pasteurization plants were discussed in considerable detail in the 1919 report, and suggestions for standard specifications were offered in last year's report.

The committee feels that it can still be of the greatest service by continuing its efforts on the standardization of equipment and methods of operation of pasteurization plants. Finding that the U. S. Public Health Service had prepared a tentative draft of such requirements, the committee deemed it wise to use this draft as a basis for its studies. It is herewith reproduced, together with such changes in the text thereof as the committee considers desirable as a result of its studies.

BUILDINGS AND EQUIPMENT

ITEM 1. FLOORS—*The floors of all rooms in which milk is handled shall be constructed of concrete or other equally impervious and easily cleaned material and shall be smooth, properly drained and provided with trapped drains, and kept clean.*

Public Health Reason—Floors constructed of concrete or other similarly impervious material can be kept clean more easily than floors constructed of wood or other pervious or easily disintegrating material, will not absorb organic matter, and are therefore more apt to be kept clean and free of odors. Properly sloped floors facilitate flushing and avoid sloppiness. Trapping of drains prevents sewer gas entering the plant. Clean floors are conducive to cleanly milk handling methods.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. When the floors of all rooms in which milk is handled are constructed of good quality concrete, equally impervious tile or brick laid closely with impervious joint material, metal surfacing with impervious joints, or of other material which is the equivalent of good quality concrete; and

2. When the floor surface is smooth and sloped so that there will be no pools of standing water after flushing, and the joints of floor and walls are constructed so as to be impervious; and

3. When the floors are provided with trapped drains so constructed as to minimize clogging; and

4. When the floors are kept clean at all times. Floors shall be kept free not only of organic filth, but also of litter. Materials and equipment not routinely used in a given room shall not be stored therein, as this practice renders it difficult to keep the floors clean. Materials and equipment not in routine use shall be stored in a special storage room or rooms in which milk handling operations are not conducted.

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*Report of the Committee on Milk Supply, presented to the Public Health Engineering Section of the American Public Health Association at the Fifty-sixth Annual Meeting at Cincinnati, O., October 18, 1927.

ITEM 2. WALLS AND CEILINGS—*Walls and ceilings of rooms in which milk is handled or stored shall be frequently painted with a light-colored paint or finished in a manner approved by the health officer and kept clean.*

Public Health Reason—Painted or otherwise properly finished walls and ceilings are more easily kept clean and are therefore more apt to be kept clean. A light colored paint or finish aids in the even distribution of light and in the detection of unclean conditions. Clean walls and ceilings are conducive to cleanly milk handling operations, and by making a good impression upon visitors increase the prestige of pasteurized milk.

Satisfactory Compliance—This item shall be deemed to have been satisfied if:

1. Walls and ceilings are finished with light painted wood, tile, smooth surface concrete or cement plaster, brick, or other equivalent materials with a washable light colored surface, and walls and ceilings are kept clean and refinished as often as the finish wears off or becomes discolored.

ITEM 3. DOORS AND WINDOWS—*All openings into the outer air shall be effectively screened to prevent the access of flies. Doors shall be self-closing.*

Public Health Reason—Flies may infect the milk with disease germs after it has been pasteurized, thus nullifying the effectiveness of pasteurization.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If all openings to the outer air or to unscreened rooms, from rooms in which milk is exposed at any time during and after pasteurization, or in which sterilized milk equipment or containers are exposed at any time, are effectively screened;

2. If fans of sufficient power to prevent the entrance of flies are in use at all ineffectively protected openings; and

3. If all doors are self-closing, and all screen doors to the outer air open outward.

Openings through which cans or crates or other articles are loaded in rapid succession so as to make impracticable the proper use of self-closing screens may be protected by properly constructed flaps or by fans of sufficient power to prevent the entrance of flies. Such fans must be operated at all times when doors are open.

Window and door screens must be tight fitting and free from holes. This includes the screens for skylights and transoms. This item must be satisfied whenever flies are evident.

ITEM 4. LIGHTING AND VENTILATION—*All rooms shall be well lighted and ventilated.*

Public Health Reason—Ample light promotes cleanliness. Proper ventilation reduces odors, and prevents condensation upon interior surfaces.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If the unobstructed window space in each room is not less than 10 per cent of the floor area in said room and the light is reasonably well distributed; or

2. If artificial light, the approximate equivalent of (1), in the opinion of the inspector, is substituted for natural light; or

3. If the natural light and artificial light are together the approximate equivalent of (1) in the opinion of the inspector; and

4. If all rooms are adequately ventilated, in the opinion of the inspector, ventilation equipment supplementary to windows and doors to be provided if necessary.

When the plant is operated during the hours of darkness artificial lighting complying with (2) must be provided.

ITEM 5. PROTECTION FROM CONTAMINATION AND FLIES—*The various milk plant operations shall be so located and conducted as to prevent any contamination to the*

milk or to sterilized equipment. All means necessary for the elimination of flies shall be used. This requirement shall be interpreted to include separate rooms for (a) the pasteurizing, cooling and bottling operations; (b) the container-washing and sterilizing operation. Cans of raw milk shall not be unloaded directly into the pasteurizing room.

Public Health Reason—If the washing and sterilizing of containers are conducted in the same room in which the pasteurizing, cooling, or bottling are done, there is an opportunity for the pasteurized product to be contaminated, particularly by flies. For this reason separate rooms are required as indicated. The unloading of cans of raw milk directly into the pasteurizing room is apt to increase the prevalence of flies therein, and render it too public.

Sometimes simple screening is not sufficient to keep out flies. For this reason other methods are required.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If the plant contains separate rooms for (a) the pasteurizing, cooling, and bottling operations, and (b) the container-washing and sterilizing operations. The pasteurizing, cooling, and bottling operations may be conducted as a group in a single room, if desired, and the container-washing and sterilizing may be conducted in a single room; but the two groups of operations must be kept in separate rooms; and

2. If cans of raw milk are unloaded either into a receiving room separated by solid or screened partitions from the pasteurizing room, or upon an outside platform, and then pushed through a flap or fan-protected opening into the receiving or pasteurizing room. The purpose of this provision is to prevent the unloading of cans directly from the trucks through open doors into the pasteurizing room, which would make the pasteurizing room too public; and

3. If all pasteurizing, cooling, bottling, and other equipment with which milk comes in contact is covered and otherwise protected to prevent the access of flies, dust, and other contamination during operation. To meet this provision surface coolers and bottlers must meet the following specifications:

a. The sections of open surface coolers shall be installed so as to leave a gap of at least ½" between the header sections to permit easy cleaning, the header faces above and below said gap to have a downward pitch of at least 10° toward the tubes.

b. Suitable means shall be provided to prevent leakage of brine or water from the headers dropping into the milk trough, by shortening the bottom trough, by the use of deflectors at the bottom of the headers, or by other approved methods.

c. All open surface coolers and open surface regenerative heaters shall be located in a separate ventilated room, or shall be provided with tight-fitting shields, preferably suspended on trolleys.

The shields shall conform to the following specifications:

(1) The material shall be copper, tinned on both sides, or other approved metal.

(2) Suitable drip flanges shall be provided.

(3) All seams shall be flush soldered.

(4) All parts shall be readily accessible for cleaning.

(5) The shields shall be tight-fitting so as to effectively protect all milk surfaces from fly or dust contamination.

d. The supports of the cooler sections shall be so located as to prevent drip therefrom from reaching the milk.

e. Regenerative heater-coolers shall be so constructed and maintained as to

prevent access of the raw milk to the pasteurized milk. The raw milk shall not be under greater pressure than the pasteurized milk.

f. Bottling machines must be provided with covers which are so constructed as to prevent any contamination reaching the inside of the bottler.

g. Bottler floats must be so designed as to be adjustable without lifting the cover.

Items (c), (e), (f), and (g) and all of Item (a) except slope on header faces are to be required for all existing equipment. All items are to be required for newly installed equipment.

4. If all necessary means supplementary to the use of screens are used for the elimination of flies.

Inspectors are urged to encourage the provision of a receiving room separate from rooms (a) and (b) defined above in Item 5, containing a dump vat the milk from which is piped into the pasteurizing room. In all proposed plants the requirement should be made mandatory.

If the design of the plant provides for pasteurizing or other equipment upon an elevated platform or mezzanine floor, the construction must be such as to prevent contamination of equipment on the lower floor from cleaning or other operations on the upper floor.

ITEM 6. TOILET FACILITIES—*Every milk plant shall be provided with toilet facilities conforming with the ordinances of the city of* .....
There shall be at least one room or vestibule not used for milk purposes between the toilet room and any room in which milk or milk products are handled or stored. The doors of all toilet rooms shall be self-closing. Toilet rooms shall be kept in a clean condition, in good repair, and well ventilated. In case privies or earth closets are permitted and used, they shall be of a sanitary type constructed and operated in conformity with the ordinances of the city of .....

Public Health Reason—The need for toilet facilities and the necessity for protecting the plant processes from toilet-contaminated flies are obvious.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If toilet facilities complying with the city plumbing code are provided; and
2. If there is at least one room or vestibule not used for milk purposes between the toilet room and any room in which milk or milk products are handled or stored; and
3. If the toilet room doors are provided with springs or checks to make them self-closing; and
4. If the toilet room, stool, etc., are kept clean, sanitary, and in good repair; and
5. If the toilet room is well ventilated.

A booth open at the top shall not qualify as a toilet room, as understood in this item.

Privies shall have fly-proof excreta chambers and shall be kept in a sanitary condition.

ITEM 7. WATER SUPPLY—*The water supply shall be easily accessible, adequate, and of a safe, sanitary quality.*

Public Health Reason—The water supply should be accessible so as to encourage its use in cleaning operations, it should be adequate so that cleaning and rinsing will be thorough, and it should be of safe sanitary quality in order to avoid the infection of milk equipment and containers.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If all milk handling rooms of the pasteurizing plant are provided with an adequate number of water outlets; and

2. If the water supply is ample in quantity to insure proper cleaning of the plant and its equipment; and

3. If the water supply is approved as safe by the state health department.

ITEM 8. WASHING FACILITIES—*Washing facilities shall be provided, including hot running water, soap, and sanitary towels of a type approved by the health officer. The use of a common towel is prohibited.*

Public Health Reason—Washing facilities and sanitary towels are essential to the personal cleanliness of the milk handlers.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If washing facilities, including hot and cold running water, soap, and individual cloth or paper towels, are provided. Washing facilities must be convenient. Bottle or can-washing vats shall not be accepted as washing facilities for personnel. Hot water must be on hand at all times, or within a reasonable time after opening the faucets. Soap and towels should be provided by the plant management. No employe shall return from a toilet to a room where milk or milk utensils are handled without first having washed his hands.

ITEM 9. MILK PIPING—*Only "sanitary milk piping" of a type which can be easily cleaned with a brush shall be used.*

Public Health Reason—Milk piping and fittings are sometimes so designed as to be difficult to clean and sterilize, or they may be constructed of metal which corrodes easily. If piping and fittings are used which are difficult to clean, or which corrode easily, or if exceptionally long lines or individual lengths of piping are used, it is unlikely that they will be kept clean. So-called "sanitary milk piping" is a term which applies to properly designed standard equipment.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. When the milk piping and connections are of such a diameter and so designed as to permit easy cleaning with a brush, and

2. When the milk piping and connections are surfaced with a heavy non-corrodible smooth finish, and all sweated connections soldered smooth and flush; and

3. When the connections are of such design as to avoid sharp corners or crevices which are difficult to clean; and

4. When all parts of interior surfaces of pipe or fittings (including valves) are of such size and shape as to be accessible either to the sight or the touch, thus making it possible to determine whether they are clean. This specification shall include ells and bends. Bent or dented milk piping shall be considered as violating this item. Wherever practicable at least 1½" piping shall be urged.

5. When the length of milk pipe lines is reduced to the minimum practicable. In no case should single lengths of piping exceed 12 feet.

ITEM 10.—CONSTRUCTION OF EQUIPMENT—*All equipment with which milk comes in contact shall be constructed in such manner as to be easily cleaned.*

Public Health Reason—If the equipment is not constructed so that it can easily be cleaned it is unlikely that it will be properly cleaned.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If all surfaces with which milk comes in contact consist of smooth, non-corrodible metal or unbroken vitreous material; and

2. If all joints are soldered flush with the surface or otherwise fitted to avoid open seams, or the surface, if vitreous, is continuous; and

3. If all surfaces with which milk comes in contact are easily accessible for cleaning, and are self-draining.

The above requirements preclude the use of iron milk pumps, which must be replaced by pumps constructed of smooth, non-corrodible metal, all parts of which can be readily taken apart for cleaning.

The above requirement also precludes the use of any type of equipment so designed as to permit milk routinely to come in contact with threaded surfaces.

In all cases where a rotating shaft is inserted through a surface with which milk comes in contact the inspector shall assure himself that the joint between the moving and stationary surfaces is close fitting.

In cases where the thermometer bulbs are inserted through surfaces with which milk comes in contact, the design must comply with the thermometer requirement of Item 16.

ITEM 11. DISPOSAL OF WASTES—*All wastes shall be disposed of in conformity with the requirements of the health officer.*

Public Health Reason—The wastes resulting from the cleaning and rinsing of containers, equipment and floors, from flush toilets, and from washing facilities, should be properly disposed of so as not to create a nuisance or a public health menace.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If all wastes are disposed of in a public sewer; or,
2. If in the absence of a public sewer, all wastes are disposed of by a method approved by the state health department;
3. If no trash or garbage is present upon the plant premises except in properly covered containers.

METHODS

ITEM 12. CLEANING AND STERILIZATION OF CONTAINERS AND APPARATUS—*All milk containers and milk apparatus shall be thoroughly cleaned after each usage and sterilized immediately before such usage in a manner approved by the health officer.*

Public Health Reason—Milk cannot be kept clean and safe if permitted to come into contact with containers and apparatus which have not been properly cleaned and sterilized. By sterilization is meant the destruction of such pathogens as are transmissible through milk supplies and all other organisms so far as practicable.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If all containers are thoroughly cleaned after each usage, and all apparatus is thoroughly cleaned once each day. Greasy or rough surfaces shall not be considered sufficiently clean. All demountable apparatus shall be taken down once each day for cleaning, including thermometer fittings where pressure-tight seats are not employed.
2. If all containers are sterilized after each usage, and all apparatus is sterilized at least once each day on a clean support such as a tank or rack (not the floor) immediately before the beginning of the day's operations in the following manner:

NOTE: The storage on racks of all demountable apparatus until just before sterilization and usage is urged.

Sterilization of Entire Assembled Equipment Immediately Prior to Day's Run—The sterilization of the entire assembled equipment immediately prior to the day's run is required. This may be done by means of steam, hot water, or chlorine solution, as follows:

Steam—If steam is used the following procedure shall be observed: Each group of assembled piping shall be sterilized separately by inserting the steam hose into the inlet and maintaining steam flow for 5 minutes. (The period of exposure required here is longer than that required for individual cans, etc., because of the heat lost through the large surface exposed to the air.) Any completely enclosed equipment continuous with the pipe system, and under pressure from the pipe system, such as pre-heaters, pumps, filters, valves, long distance flow holders, regenerative heater-coolers, etc., may be considered as having been adequately sterilized by means of the above procedure.

Equipment not under pressure from the pipe line, however, such as weigh cans, storage vats, fore-warmers, clarifiers, separators, pasteurization vats and pockets, coolers, and bottlers must be sterilized separately. This may be done by inserting a steam hose into an inlet or outlet end, with all covers tightly closed, and maintaining steam flow for 5 minutes.

NOTE—Brine type coolers must be drained before the application of steam. The refrigerant valves must be closed.

Hot Water—If hot water is used the sterilization may be done by pumping hot water through the entire equipment, the temperature of the water and the period of pumping being such that the temperature of the water appearing at the outlet end of the assembly will have been at least 170° F. for at least 5 minutes.

If the assembly is so long that it is difficult to secure this temperature and time at the outlet end, the equipment should be sterilized in sections.

Supplementary sterilization should be applied to any holder or to any other equipment the entire surface of which is not reached by the hot water. This may be done by means of steam in the manner previously described.

Some plants have found it effective to submerge piping and fittings in hot water. This shall be considered satisfactory provided the specified time and temperature are maintained.

NOTE: Care should be taken to see that the hot water covers the entire surface of all coolers. These, if of the brine type, must be drained before sterilization. Refrigerant valves must be closed. All equipment must have covers in place.

Chlorine—The inspector shall insist upon heat sterilization wherever practicable. If chlorine solution is used it shall be of such a strength that the solution appearing at the outlet end will show at least 100 p.p.m. of available chlorine. The chlorine solution should be pumped through the entire equipment for at least 5 minutes.

Here again, such surfaces as are not reached by the chlorine solution shall be sterilized with steam as previously described, or the spray method of applying chlorine solution may be used for such surfaces as are not reached by the flowing chlorine solution.

Bottler Sterilization—The bottler must be completely assembled before using any of the above methods. In the case of hot water or chlorine sterilization the bottler must be operated during the process of sterilization so as to insure sterilization of all valves and fittings. This is not necessary in the case of steam sterilization, but in this case the valves must be individually sterilized in place. This operation can be made most effective by attaching a device to the end of the steam hose which will enclose the valve and confine the steam.

Caution—If the pasteurization plant becomes infected with thermophilic organisms it may prove that more intensive sterilization or a change in sterilization methods may be necessary. If the steam or hot water method of sterilization has

been in use an attempt should be made to sterilize at higher temperatures and for longer periods. (Above 200° F. for more than 10 minutes.)

Bottle and Can Sterilization—Small plants, for which automatic washers may be deemed too large, frequently wash their bottles manually; for these the use of the steam cabinet, the use of an individual steam jet plate provided with a hood, or the use of chlorine immersion type apparatus, is accepted as compliance.

Larger plants should be encouraged to use the hydraulic jet type washer and sterilizer, or the immersion soaker type washer and sterilizer, provided that in each case a steam, hot water, or chlorine solution jet section is included. In these types of equipment the use of a strong alkali solution (not less than 2.5 per cent should be approved) makes it possible to use a shorter exposure period for the final sterilization agent. The inspector should satisfy himself by bacteriological examination that the effect of the combination of the various sterilization agents is such as to produce bottles and cans having a residual bacterial infection of not more than 1 per c.c. of capacity. After sterilization cans shall be so treated as to dry rapidly.

ITEM 13. STORAGE OF CONTAINERS—*After sterilization all bottles, cans, and other containers shall be stored in such manner as to be protected from contamination.*

Public Health Reason—If milk containers are not protected from contamination after having been sterilized and until again used, the value of sterilization will be partly or entirely nullified.

Satisfactory Compliance—This item shall be deemed to have been satisfied if all bottles, cans, and other containers, after having been sterilized, are stored in crates or on racks in a clean place protected from flies and dust until again used. Such containers as can conveniently be inverted shall be stored in an inverted position.

Floors of all rooms shall not be flushed when crates of sterilized bottles are stacked thereon.

ITEM 14. HANDLING OF CONTAINERS AND APPARATUS—*Between sterilization and usage all containers and apparatus shall be handled in such manner as to prevent any part of the person or clothing from coming in contact with any surface with which milk or milk products come in contact.*

Public Health Reason—Carrying bottles by inserting one or more fingers into their mouths, running the hands over the surface of milk coolers, bottling machines, or pasteurization equipment, or allowing the clothing to brush against sterilized surfaces with which milk comes in contact, will obviously nullify the effect of sterilization.

Satisfactory Compliance—This item shall be deemed to have been satisfied if the inspector is assured that the employes of the pasteurization plant are using every reasonable precaution to prevent the milk contact surfaces of containers and apparatus from coming into contact with their persons or clothing between the time they are sterilized and the time they are again used.

ITEM 15. STORAGE OF CAPS—*Milk bottle caps shall be purchased and stored only in sanitary tubes and shall be kept therein until used.*

Public Health Reason—Soiled or contaminated caps nullify the benefits of the safeguards prescribed throughout the ordinance, and packing the caps in tubes which are unbroken until they are placed in the bottling machine is the best manner of assuring cap cleanliness.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If all bottle caps are purchased in tubes; and

2. If the tubes are stored so as to be kept clean.

The storage of cap-tubes in dusty places or the refilling of tubes with spilled caps violates this item. The first cap should be discarded as it is exposed and may be contaminated.

ITEM 16. PASTEURIZATION—*The terms "pasteurization," "pasteurized," "pasteurize," and similar terms shall be taken to refer to the process of heating every particle of milk or milk products to a temperature of not less than ..... ° F.* and holding at such temperature for not less than 30 minutes in pasteurization apparatus approved by the health authority, the temperature and time being automatically recorded by a temperature and time recording device approved by the health authority.*

The time and temperature charts shall be dated and preserved for a period of 3 months for the information of the health officer.

*NOTE: The temperature of pasteurization has been left blank pending a pronouncement of time and temperature lethal limits by the Laboratory Section of the American Public Health Association. The present committee report limits itself to what is commonly known as the "holding process."

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If the design of the apparatus meets the following specifications; and
2. If the apparatus is operated in accordance with the following requirements:

DESIGN SPECIFICATIONS—

a. *Indicating and Recording Thermometers*—The following specifications shall be complied with in the case of all new equipment and in the case of all replacements of indicating and recording thermometers. They shall also apply to all repairs of recording thermometers requiring a renewal of the tube system.

Paragraphs (1) and (5), shall apply to all existing equipment.

(1) Both indicating and recording thermometers shall be installed on each vat in which the holding time is not automatically controlled, and in both inlet and outlet manifolds of vat, pocket or continuous flow installations in which the milk is brought to the final pasteurization temperature before entering the holder, and in which the holding time is automatically controlled.

(2) Indicating thermometers shall be armored and shall have not less than $\frac{1}{8}$" scale divisions per degree, and shall be adjusted to be accurate within the limits of readability with the naked eye at the legally required temperature of pasteurization. A line shall be etched in the thermometer stem at this point. The thermometer shall be of such type and so located as to render reading convenient.

(3) Recording thermometers shall have not less than $\frac{1}{16}$" scale divisions per degree at the legally required temperature of pasteurization, on a standard 12-hour chart, and shall be calibrated and set to be accurate within the limits of readability with the naked eye at the legally required temperature of pasteurization. They shall be protected against damage at a sterilization temperature of 220° F. The case shall be moisture proof. The tubing shall be as short as possible.

(4) Bulb fittings of all new indicating and recording thermometers must have pressure-tight seats against the inside wall of the holder or pipe into which they extend. No threads shall be exposed to the milk. The location of the seats shall conform to that of the standard International Milk Dealers Association wall-type fitting.

(5) The local or state inspector shall check the accuracy of all indicating thermometers at the legally required temperature of pasteurization by means of a

standardized thermometer reading to within 0.2° F. This shall be done by one of the following methods:

(a) By dismounting each indicating thermometer and immersing its bulb to its normal immersion depth in a large vat of water brought to the pasteurization temperature, as indicated by the standardized thermometer, and then checking one against the other. In case a small container, such as a milk can, is used, it should be insulated by blankets, sacks, or paper to prevent rapid drop in temperature of the water during checking. No container holding less than 5 gallons shall be used. The water shall be continuously agitated.

(b) By lowering a standardized maximum registering thermometer to the position of the bulb of the indicating thermometer in the holder during the holding period with the milk in agitation.

The inspector shall identify by number, seal or otherwise the indicating thermometer when tested.

b. *Uniform Temperatures and Flush Valves*—The holder shall be so designed that no particle of milk will at any time during the holding period be more than 1° F. colder than the temperature registered by the indicating and recording thermometers, when they are in proper adjustment, as determined with suitable testing equipment.

In all cases except where outlet valves are coupled very close to the holder and continuously steamed during the entire holding period, compliance with this specification requires the use of flush-type outlet valves. Pipe sections, even though but two or three inches long, between the body of the holder and the outlet valve, will contain milk which may be more than 1° F. below the registered temperature, for part or all of the holding period. Inspectors shall therefore require all new pasteurization holders to be equipped with flush-type valves. All existing holders shall be equipped with either flush-type valves or with close-coupled valves designed for continuous steaming during the entire holding period.

c. *Leak Protector Inlet and Outlet Valves, or Valveless Method of Filling and Emptying*—Leak protector inlet and outlet valves, or a valveless method of filling and emptying, shall be provided for each vat or pocket of vat and pocket type installations, except in the case of single vat installations. Leak protector outlet valves shall be provided with a steaming connection.

This specification is necessary because outlet valves become contaminated with leakage during the filling, heating and holding periods. This contamination is not avoided, of course, by the leak escape feature above described. For this reason, either manual or automatic steaming of effluent valves, either continuously during the holding period or just prior to the discharge of pasteurized milk from any holder, is required.

The reason for the above specification is that no ground surface valve will long remain leak-proof. If the valve in question is an inlet valve, connected to the raw supply, the raw milk will leak into the pasteurizing chamber during the holding and emptying periods. This leakage will, of course, not have been pasteurized for the required length of time.

On the other hand, leakage escaping past outlet valves before the milk in the holder has been held for the full holding period, will contaminate the pasteurized supply.

d. *Foam*—If foam is present in the holders of vat or pocket types they shall be equipped with a steam or hot air device which will keep the atmosphere above the body of the milk at a temperature equal to at least the legally required pasteur-

ization temperature during the heating and holding periods, or shall be otherwise constructed to effect this result. If steam is used, the steam line shall be provided with a trap properly designed to avoid the discharge of water into the body of the milk.

Public Health Reason—This specification is included because a large percentage of the designs of milk handling equipment in use today result in the formation of a blanket, or of islands of foam on the surface of the milk in the vat or pocket type holders, and because the temperature of the air above the milk is frequently far below the temperature of pasteurization, and studies show that the temperature of the foam can be well below 130° F. when the main body of the milk is at 145° F.

It is obvious, of course, that the mixture of foam and milk which leaves the holder at the end of the pasteurization process is not safely pasteurized. Infection present in the foam before pasteurization may be present in the foam after pasteurization, which will partly reduce the effectiveness of the pasteurization process. The remedy is, of course, either to eliminate the foam entirely, or to keep the foam at the pasteurization temperature.

Steps are now being taken by the manufacturers of milk plant equipment to eliminate or reduce foam by correcting the designs of the principal offenders, such as milk pumps, milk clarifiers, flash heaters, and turbulence-producing inlet devices to pasteurization vats or pockets. Excellent progress is being made and properly designed equipment will probably result in the elimination of much, if not all, of the foam.

It is not probable, however, that foam will ever be completely eliminated, and one alternative remedy is to require the heating of the atmosphere above the milk by means of either steam or hot air. If air is used it should be moist to prevent the formation of a skin or pellicle of dried milk at the surface of the body of the milk.

All pasteurization plants have steam available, and the introduction of a small jet of steam above the body of the milk will be a simple procedure. A trap should, of course, be provided to prevent any water of condensation in the steam line from reaching the pasteurization chamber. The condensation of steam in the chamber itself will be insignificant in quantity.

e. *Covers*—The covers of vats must be so constructed that nothing on top thereof will drop into the vat in either their open or closed position. Some vat covers are so designed that pools of milk or condensation, etc., which may have accumulated on top of the covers, may drop into the milk. This sometimes occurs through the inlet port of the cover, or by drip over the back edge of the cover into the vat when the cover is raised. Inasmuch as the material thus entering the vat may be contaminated because of its exposure, it is necessary that the cover be so designed as to overcome this objection. This may be done by means of vertical fins, overlapping edges, and set-back hinges. It will usually be a simple matter for the plant owner to have a local tinner make the necessary corrections in the design of the cover.

f. *Insurance of Minimum Holding Time in Continuous Flow and Pocket Type Holders*—Continuous flow holders shall be constructed and equipped in a manner to insure that every particle of milk will be held for the required period. In order to meet this requirement the holder shall be equipped at both inlet and outlet end with a pump geared directly to a properly timed constant-speed motor,* except that in the case of installations in which the holder empties by gravity the outlet pump is not required. In this latter case the valve on the outlet piping shall be of such a size and so constructed that every particle of milk issuing from the holder during the

emptying period will have been held in the holder for the legally required holding period.

*NOTE: The committee recommends that American Society of Electrical Engineers be requested to advise as to the maximum upward deviation in speed which may be expected from constant-speed motors as a result of fluctuations in voltage.

Pocket type holders shall be equipped with a timing device operated by a constant-speed motor so that every particle of milk will be held for the legally required holding period.

Each continuous flow or pocket type installation shall be tested to insure that it is exposing every particle of milk to the required holding period.

In the case of pocket type installations this may be done by checking the timing device with a watch.

In the case of long distance flow holders this may be done by means of either chloramine, uranine, starch-iodide or prodigiosus. When the chloramine, uranine or starch-iodide methods are used the solution may be pumped through the holder at the pasteurization temperature. When the prodigiosus method is used lower temperatures must be used in order to avoid killing the organisms.

The following is a suggested method of using chloramine, uranine or starch-iodide solutions:

A cap on the inlet pipe to the holder is drilled to receive a rubber stopper perforated for use with a large sized (at least 50 c.c.) veterinary syringe. The needle is not required, as the glass nipple of the syringe can be inserted directly into the hole of the stopper, thus increasing the speed of injection.

The syringe is filled with a saturated solution of chloramine, uranine or starch and the solution injected after the installation is in smooth operation with water at the pasteurization temperature. The time of beginning injection must be observed accurately.

Twenty-five minutes after the solution has been injected the taking of samples at the outlet end of the holder is begun and continued at 30-second intervals. These samples are tested for the presence of chloramine, uranine, or starch. The difference in time between injection and appearance at the effluent end is the observed holding time.

The holding time during filling or emptying of the holder may not be identical with the holding time observed for normal flow conditions.

The holding time during filling may be determined: (1) by injecting the solution 10 minutes after filling has begun; (2) opening of the effluent valve and beginning routine flow through the holder, as soon as the holder is full, but not before the lapse of 30 minutes from the beginning of filling; and (3) by taking samples at the effluent end at 30-second intervals from and after 25 minutes from the time the solution was injected. The holding time is then computed as before.

The holding time during emptying may be determined by injecting the solution at the moment the emptying operation begins and observing the time taken to reach the effluent end by taking samples as before.

For testing by means of prodigiosus the following method evolved by the U. S. Department of Agriculture is used:

The supply tanks, heaters and holders are cleaned. The system is then filled with tap water at ordinary temperature. A supply of water sufficient to run the apparatus for 30 minutes at its rated capacity is essential. The apparatus is then run at its rated capacity, using water in the same way as when milk is being pasteurized, except that no heat is used. Repeated checks upon the rate of flow are necessary. Samples of water for bacteriological analysis are taken at the inlet and outlet of the holder. These are check samples. A water emulsion of a 24-hour-old agar culture of

the test organism (*Bacillus prodigiosus*) is then introduced at the inlet of the holder, the time being noted. Samples are then taken every 3 minutes at the outlet of the holder up to 18 minutes, and every minute thereafter up to 30 minutes. One cubic centimeter of each sample is then plated, plain agar being the medium used. Plates are incubated for 48 hours at 20° C. (room temperature). At the end of this period the holding time is determined by the first plate in the series that shows the presence of the test organism. The organism produces a very characteristic and distinctive deep-red colony. Check samples should show no red colonies if the test is to be accepted.

OPERATION REQUIREMENTS FOR PASTEURIZATION MACHINERY—

a. *Checking Recording Thermometers Daily*—The recording thermometers shall be checked against the indicating thermometers daily by the plant operator, and at least bi-weekly by the health officer, and shall be kept adjusted so as at no time to read higher than the indicating thermometer.

b. *Maintaining Minimum Legal Pasteurization Temperature*—The pasteurization equipment shall be operated so that the indicating and recording thermometers both read at least 1° F. higher than the legally required pasteurization temperature continuously throughout the holding period.* The indicating, and not the recording, thermometer shall be used as an index of temperature by the plant operator.

* NOTE: If designs are accepted which have shown on test a design deviation of more than one degree, the actual deviation found shall be substituted for the one degree requirement above made.

c. *Maintaining Minimum Holding Period*—Vat type installations shall be operated so that the record charts shall indicate at least 1° F. higher that the legally required pasteurization temperature for a period of time for each run equal to the normal filling time, plus the normal emptying time, plus at least 30 minutes. The normal filling and emptying time for each vat from and to the level of the recording thermometer bulb in the vat shall be determined by the inspector.

The automatically controlled holding periods of pocket and continuous flow type installations shall be checked once for each installation and immediately following any repairs or alterations.

d. *Identification and Preservation of Recording Thermometer Charts*—All recording thermometer charts shall be preserved for a period of three months for the information of the health officer. All charts shall contain the following information:

(1) Date.

(2) The name of the plant.

(3) The number of the pasteurizing vat or installation to which the thermometer is attached, in case more than one pasteurizer is in operation at the plant. In the case of continuous flow or pocket type installations the chart shall indicate whether the thermometer concerned is located at the inlet or outlet end of the installation.

(4) The reading of the indicating thermometer and the corresponding time indicated by the recording thermometer, taken at some one time during the day when the indicating thermometer shows the legally required minimum temperature of pasteurization.

e. *Disconnection of Single Vat Holders from Inlet and Outlet Piping*—Single vat installations not provided with leak protector inlet and outlet valves shall be disconnected from the raw milk supply during the heating, holding and emptying periods, and from the outlet piping during the filling, heating and holding periods.

f. *Steaming of Outlet Valves*—Except in the case of single vat installations all outlet valves and fittings subject to contact with incompletely pasteurized milk shall be steam sterilized automatically immediately before the discharge of pasteurized

milk. In the case of single vat installations, which are not required to be equipped with a steaming connection outlet valve, this requirement may be satisfied by blowing steam from a steam hose into the outlet end of the valve for at least 1 minute. In all but single vat installations the steam connected leak protector outlet valve, which affords automatic sterilization, is required.

In the case of long distance flow holders the outlet valve shall be steamed after the holder has been completely filled with milk (not before 30 minutes after starting to fill the holder) and shall not be opened until after the steaming operation.

g. *Maintaining Proper Temperature of Air Above Foam*—The plant operator is required to insure that the air temperature of vats and pockets in which any foam occurs is kept at or above the legally required temperature of pasteurization by means of the steaming connection or other device previously described.

h. *Closed Covers*—The covers of all equipment must be kept closed during operation, except in the case of emergency.

i. *Repasteurizing Improperly Pasteurized Milk*—Any milk which accidentally passes through pasteurization equipment without having been properly pasteurized shall be repasteurized and all equipment involved resterilized.

j. *Preheating Holders*—All holders used for holding milk which has been heated to the pasteurizing temperature before entering the holders shall be preheated with steam or otherwise so that the metal shall be at least at the pasteurizing temperature before the holding period begins.

ITEM 17. COOLING—***All milk not pasteurized within two hours after it is received at the plant shall then be immediately cooled to a temperature of 50° F. or less and maintained thereat until pasteurized; and all pasteurized milk shall be immediately cooled to a temperature of 50° F. or less and maintained thereat until delivery.***

Public Health Reason—If milk is not cooled within a reasonable time after it is received at the pasteurization plant its bacterial count will be materially increased, possibly affecting the flavor of the pasteurized milk, which would act as a sales barrier to pasteurized milk.

The same public health reasons apply to the cooling of the milk after pasteurization. If pasteurized milk is permitted to become warm and approach souring before delivery, a sales barrier will be created, whereas it should be one important duty of the health officer to encourage the greater consumption of pasteurized milk.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If all milk intended for pasteurization, but not pasteurized within two hours after it is received at the plant or cooling station, is then immediately cooled to 50° F. or below, and maintained thereat until pasteurized.

2. If all pasteurized milk is cooled immediately after pasteurization to 50° F. or below and maintained thereat until delivery.

ITEM 18. BOTTLING—***Bottling shall be done in automatic machinery approved by the health officer in such manner as to prevent any part of the person or clothing from coming in contact with any surface with which milk or milk products come in contact.***

The term "automatic machinery" is not interpreted to exclude machinery operated by man-power, but is interpreted to exclude methods which require manual contact with the bottles between filling and capping, or in which the bottling and capping devices are not integral in one machine.

Public Health Reason—Hand-bottling is very apt to result in the exposure of the milk to infection, which would nullify the effect of pasteurization.

Satisfactory Compliance—This item shall be deemed to have been satisfied if the bottling is done by automatic machinery which:

1. Is of a design which does not require frequent adjustment during operation, thus exposing the milk to danger of contamination; and
2. Is of a design which protects the milk within it from contamination by dust or flies.
3. Is of a design which can be readily cleaned and sterilized.
4. Is of such design as to permit float adjustments without removing the cover.
5. Is provided upon the filler pipe of the bottler, and as close to the top of the bottler as possible, with an apron or other approved device to prevent water of condensation or drip from fingers reaching the inside of the bottler during float adjustments.
6. Has all surfaces with which milk comes in contact of smooth, non-corrodible material, readily accessible for cleaning.

NOTE: Bottler designs which do not include filler pipes or floats shall not be required to comply with Items 4 or 5.

ITEM 19. OVERFLOW MILK—*Overflow milk which has become machine contaminated shall not be sold for human consumption.*

Public Health Reason—Milk which has come in contact with equipment surfaces which have not been sterilized or safeguarded after sterilization, has been exposed to infection, and is therefore dangerous.

Satisfactory Compliance—This item shall be deemed to have been satisfied so long as there is no evidence of the use of spilled or overflow milk for delivery to consumers.

ITEM 20. CAPPING—*Capping shall be done by machinery approved by the health officer. Hand capping is prohibited.*

Public Health Reason—Hand capping is apt to expose the milk to contamination.

Satisfactory Compliance—This item shall be deemed to have been satisfied:

1. If all newly installed bottlers are equipped with an automatic capping mechanism of a design which does not require frequent adjustment; and
2. If bottles missed or imperfectly capped are dumped into cans or other containers and the dumped milk repasteurized.

Attempts to adjust caps by hand, or to remove them and recap either by hand or by machine, inevitably expose the milk in the bottle to manual contamination. The substitution of a pick for the fingers in removing caps does not prevent manual contamination inasmuch as the point of the pick, which often touches the milk, is exposed to contamination from the fingers, etc.

The above requirement is specially important because a fundamental rule in the case of pasteurized milk is that it shall be protected against contamination, particularly manual contact, from the time it is pasteurized until delivery.

H. A. WHITTAKER, *Chairman.*

H. D. PEASE C. A. HOLMQUIST
RALPH E. IRWIN LESLIE C. FRANK

NOTE: The committee will welcome constructive criticism on this report for its guidance. The committee requests that such criticism be addressed to the Chairman, H. A. Whittaker, Minnesota Department of Health, Division of Sanitation, Minneapolis, Minn.